# General Plan

## Master Environmental Assessment / Final EIR

STATE CLEARINGHOUSE NO. 91022067



# City of Redlands

# *CITY OF REDLANDS*

# *MASTER ENVIRONMENTAL ASSESSMENT AND FINAL ENVIRONMENTAL IMPACT REPORT FOR 1995 GENERAL PLAN*

**CERTIFIED ON OCTOBER 17, 1995**
**BY CITY COUNCIL RESOLUTION NO. 5220**

RESOLUTION NO. 5220

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF REDLANDS CERTIFYING THE MASTER ENVIRONMENTAL ASSESSMENT AND ENVIRONMENTAL IMPACT REPORT FOR THE REDLANDS GENERAL PLAN AS REQUIRED BY THE CALIFORNIA ENVIRONMENTAL QUALITY ACT

RECITALS

WHEREAS, an Environmental Impact Report (EIR) is required due to potential effects identified in an initial study and environmental evaluation for the General Plan for the City of Redlands; and

WHEREAS, a Master Environmental Assessment (MEA) and EIR for the proposed General Plan has been prepared for the City of Redlands by Blayney, Dyett, Greenberg Planning Consultants and Smith, Peroni & Fox Planning Consultants, Inc., which is incorporated herein by this reference; and

WHEREAS, the EIR was prepared in compliance with the California Environmental Quality Act, State Guidelines, and the CEQA Guidelines of the City of Redlands; and

WHEREAS, the EIR is a Program EIR subject to the following provision of the State Guidelines for the California Environmental Quality Act: "That subsequent activities shall be examined in the light of the General Plan EIR to determine whether an additional environmental document must be prepared." The City shall use an initial environmental evaluation to document the environmental evaluation of subsequent activities to determine whether the environmental effects of the subsequent activities are covered in the General Plan EIR; and

WHEREAS, distribution of the Draft EIR was made to interested public and private agencies with a solicitation of comments and evaluation; and

WHEREAS, the public review period of the Draft EIR ended on September 25, 1995 incorporated within the Final EIR are comments of the public, Planning Commission staff, and other local agencies, and the City's responses thereto; and

WHEREAS, the Draft EIR and Final EIR have been reviewed by staff, and represent staff's independent evaluation, judgment and analysis; and

WHEREAS, the Planning Commission held a public hearing to consider the Final EIR and General Plan and recommended to the City Council, based on the Commission's exercise of its independent judgment, that the EIR should be certified as in compliance with the provisions of the California Environmental Quality Act and State Guidelines; and

WHEREAS, a public hearing was duly called, noticed, and held by the City Council on the Final EIR; and

WHEREAS, the final EIR was distributed to the City Council and the City Council has independently reviewed and exercised its independent judgment regarding the sufficiency of the Final EIR, received public testimony and considered comments and responses thereto in its review of the General Plan; and

WHEREAS, changes or alterations have been incorporated into the General Plan which mitigate or avoid certain of the significant environmental effects thereof; pursuant to the provisions of the California Environmental Quality Act and the State Guidelines, all significant environmental effects and corresponding mitigation measures together with the requisite findings and facts related thereto have been comprehensively set forth in Exhibit "A" which is attached hereto and incorporated herein by this reference; mitigation measures have been adopted as part of the General Plan or will be incorporated at the appropriate project level; that establishment and implementation of the General Plan, as submitted, and of subsequent development review will incorporate all of the mitigation measures identified in the Final General Plan EIR; and that the benefits of the project have been balanced and considered against its possible unavoidable environmental risks and against the project alternatives identified in the Final General Plan EIR and those benefits are found to be overriding, all as set in Exhibit "B" which is attached hereto and incorporated herein by this reference; and

NOW, THEREFORE, BE IT RESOLVED BY the City Council of the City of Redlands as follows:

Section 1. That the City Council has reviewed and considered information contained in the Final Environmental Impact Report prior to taking action on the General Plan Update and certifies the Environmental Impact Report as complete. The City Council further adopts the Statement of Findings and Facts and incorporates the same herein by reference. The City Council finds that the mitigation measures identified in the Statement are necessary to reduce or avoid significant impact and that certain impacts, as identified in the Statement, even with implementation of all recommended mitigation measures, will remain significant and further adopts the Statement of Overriding Considerations and incorporates the same herein by reference.

Section 2. That the City Clerk shall certify as to the adoption of this Resolution.

ADOPTED, SIGNED AND APPROVED this 17th day of October, 1995.

Mayor of the City of Redlands

Attest:

**EXHIBIT "A"**

# CITY OF REDLANDS GENERAL PLAN
# STATEMENT OF FINDINGS AND FACTS
# PURSUANT TO THE CALIFORNIA ENVIRONMENTAL QUALITY ACT

## I. INTRODUCTION.

The Final Environmental Impact Report (EIR) for the proposed General Plan identified significant effects that may occur as a result of buildout of the City of Redlands according to the proposed project. In accordance with the California Environmental Quality Act (CEQA), State and City Guidelines, the City of Redlands hereby adopts the findings in this report.

The City of Redlands prepared an EIR for the proposed General Plan in accordance with CEQA, State and local guidelines. The City independently reviewed and analyzed the EIR and has determined that the EIR reflects independent judgement of the City. The EIR was subject to review and approval by the City of Redlands Planning Commission and City Council. At a regular meeting held on October 10, 1995, the Planning Commission recommended certification of the EIR as adequate and in compliance with CEQA, and on October 17, 1995 at a public hearing the EIR was certified by the City Council as adequate and in compliance with the provisions of CEQA.

Along with adopting this Statement of Findings and Facts, the City of Redlands City Council adopts the Master Environmental Assessment and General Plan. Subsequent actions to cause consistency with the General Plan including, but not limited to, changes of zone and amendments to the Zoning Ordinance will also be reviewed based upon the documentation in the Final EIR.

This document provides a summary of the General Plan and the EIR, its findings and conclusions. Refer to the EIR for a detailed discussion of the project description and environmental impacts.

## II. PROJECT DESCRIPTION

The proposed project is a comprehensive update of the City's General Plan and revision of the General Plan Land Use Map. The General Plan is a compilation of the goals, policies, and implementation programs that will guide physical development in the City, its sphere of influence Redlands' Planning Area and through the year 2010. The project area covers 52 square miles, including 37 square miles of incorporated area, 11.2 square miles of sphere of influence in the northwesterly "donut hole" area and westerly Mentone and

Crafton areas, and 4.8 square miles of sphere expansion area in the northwesterly Greenspot area.

The General Plan Elements and Policies.

The EIR evaluates the impacts from implementation of the policies of the individual Elements of the General Plan Elements which consist of the following: Growth Management, City Design and Preservation, Land Use, Circulation, Housing, Open Space and Conservation; Health and Safety, Noise, Human Services, and Economic Development. The Growth Management Element, an optional element, establishes policies for the amount and rate of growth and the timing of public improvements. The City Design and Preservation Element is an optional element that establishes policies for visual design Citywide, and policies for preservation of architectural resources. The Land Use Element establishes land use classifications, densities and intensities of development and creates a pattern of land uses (including open space) illustrated by the General Plan Diagram. The Circulation Element establishes policies for freeways, arterials, collector streets, trails, bikeways, transit, transportation systems management, railroads, the Redlands Airport, and utility corridors. A system of traffic ways is illustrated on the General Plan Diagram. The Housing Element establishes policies designed to meet five year housing needs for all income levels. The Open Space and Conservation Element establishes policies for management of four categories of open space lands, including parks, and prescribes policies for conservation of both natural and cultural resources. Parks and open space to be preserved are illustrated on the General Plan Diagram. The Health and Safety Element establishes policies for water quality preservation and protection from fire hazards, drainage and flooding, seismic, geologic, and soils hazards, wind hazards, magnetic fields, airport aviation safety and emergency management. Air quality policies are derived from the model Air Quality Element prepared for San Bernardino County cities. The Noise Element projects future traffic noise and sets policies for mitigation of noise from all sources. The Human Services Element is an optional element that establishes policies for senior services, youth services, and health services. The Economic Development Element, also an optional element, provides a framework to develop and adopt policies and actions which affect the City's economy.

Land Use.

The land use policies described in the Land Use Element are depicted graphically on the land use diagram (GP Figure 4.1). Proposed land uses in the project area include residential, office, commercial, industrial, public institutional, parks, agriculture, flood control/construction aggregates conservation/ habitat preservation, and resource conservation. Residential uses include rural living (generally in the Live Oak Canyon, Crafton, and Greenspot areas); very low density (San Timoteo Canyon, Live Oak Canyon, hillside areas, the south portion of Redlands, and portions of northeast Redlands);low density residential (portions of south, east and north Redlands);low- medium density (west of the University of Redlands and Mentone area); medium density (around the downtown

area and along major arterials to the north, east, west and south of downtown); and high density (downtown and along major arterials east and west of downtown). Office is located along Cajon and Brookside, Barton Road and Alabama, in the vicinity of Redlands Community Hospital, and at the intersection of Ford and Redlands Blvd. Commercial is located in the downtown, along the freeways and major arterials in the northwest portion of the City and in smaller area interspersed within the residential areas. Most of the industrial land uses are located in the west and northwest sectors of the City although some industrial land is located in the vicinity of the Redlands Municipal Airport and the Mentone area. Public institutional use designations accommodate the airport, government and civic buildings, schools, libraries, museum, fire and police stations and landfills in appropriate locations to serve the population. Agricultural uses are located in the northeast portion of Redlands and in small locations throughout the City. Flood control/construction aggregate/habitat conservation is located primarily along Mill Creek and the Santa Ana River Wash, although there is a small designation along San Timoteo Canyon Creek. Resource Conservation is located in the hillside areas in the south, east, and northeast portions of the City and planning area.

## III. FINDINGS OF FACT

The City of Redlands Planning Commission and City Council have reviewed the EIR for the proposed General Plan and have considered all written and verbal public testing on the project. The public record for the project is composed of the following elements:

- Draft General Plan (8/17/95) as amended by the Planning Commission and the City Council.
- Draft and Final MEA and EIR prepared the Redlands General Plan and Technical Appendices.
- All records relating to the City of Redlands General Plan Citizens Committee which included over 40 public meetings held from October, 1988 through March, 1992.
- All records relating to the study sessions and public hearings of the Planning Commission from February 20, 1992 through October 10, 1995.
- All records relating to the study sessions and public hearings of the City Council from October 1988 through October 17, 1995 include the 20 public hearings from July 5, 1994 through October 17, 1995.

There are four possible findings under CEQA with respect to significant effects of the project.

- <u>Finding 1</u>: Impacts identified will not cause a significant impact on the environment.

- Finding 2: Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effects identified in the EIR.

- Finding 3: Such changes or alterations are within the responsibility and jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by such other agency or can and should be adopted by such other agency.

- Finding 4: Specific economic , social, technical or other considerations make infeasible the mitigation measures or project alternatives identified in the EIR.

After reviewing the EIR and the public record for the project, the City of Redlands hereby makes the findings in Section 4, regarding the environmental effects of the proposed General Plan project, pursuant to Section 15091 of the State CEQA guidelines.

## IV. ENVIRONMENTAL EFFECTS/IMPACT FINDINGS, MANDATORY FINDINGS, FACTS IN SUPPORT OF THE FINDINGS.

### A. ENVIRONMENTAL IMPACTS WHICH CAN BE AVOIDED OR MITIGATED TO A LEVEL OF LESS THAN SIGNIFICANT

#### 1. Land Use Impacts and Mitigation Provided by Plan Policy

Buildout of the proposed General Plan will increase the number of dwelling units within the City and its planning area by approximately 9,500 over existing conditions. The amount of non-residential building area would increase by approximately 31,500,000 square feet. The most substantial growth area associated with the project is industrial and commercial land uses in the northwestern portion of the City. However, the majority of commercial/industrial is located in the East Valley Corridor Specific Plan, approved as a General Plan Amendment in 1989. Most of the remaining undeveloped land in the planning area would remain in open space or be developed at very-low residential densities.

Impacts associated with land use can be reduced to a level of less than significant by implementation of the mitigation measures identified in the General Plan EIR and the policies contained in the General Plan. Implementation of those policies by the City will reduce the impacts to a level of less than significant based on information and analysis contained in the General Plan EIR on the following facts:

- The General Plan Diagram establishes land use patterns throughout the City and planning area which promote orderly patterns of development and the establishment of harmonious land uses.

- Policies in the Land Use Element prevent land use conflicts from occurring both within the Planning Area and with uses in surrounding jurisdictions.

- Policies contained in other elements of the General Plan also serve to prevent land use impacts.

## 2. Geotechnical Impacts and Mitigation Provided by Plan Policy

Potential geotechnical hazards or constraints may occur within the planning area steep slopes. Slopes greater than 15 percent are subject to erosion of both soil and rock. Of the 33,100 acres in the Planning Area, approximately 4,200 acres have sloping lands of 15-30 percent, and approximately 3,700 acres have sloping lands exceeding 30 percent. Other geologic and geotechnical hazards which may affect development include: Slope instability, such as natural and man-made landslides, rockfall, mud/debris flow and soil creep; subsidence (groundwater withdrawal); expansive soils; compressible/collapsible soils, such as water induced ground collapse; percolation potential/effluent disposal; and, blasting impacts.

Several seismically active and potentially active faults either transect or are in close proximity to the Planning Area. The California Division of Mines and Geology has identified active faults under the Alquist-Priolo Earthquake Fault Zone Act. In the vicinity of the Planning Area, the San Andreas and San Jacinto faults have been classified as "active" under the Alquist-Priolo Act. Other active or potentially active faults include the Redlands fault, the Reservoir Canyon/Crafton fault, the Loma Linda fault, the Greenspot fault and portions of the Chicken Hills and Western Heights faults.

Despite preventive policies in the General Plan, the Planning Area is part of the seismically active southern California region and the buildout of the General Plan may result in the exposure of additional people and structures to unanticipated seismic events. To the extent that commonly accepted seismic regulation provides protection, General Plan policies and additional policies contained in Section 5.2 of the EIR will to provide adequate mitigation. Implementation of those policies identified in the General Plan by the City of Redlands will reduce the impacts to a level of less than significant based on information and analysis contained in the General Plan EIR and on the following facts:

- The General Plan includes policies requiring identification and avoidance of geotechnical hazards where possible and/or the use of construction techniques which recognize and accommodate geotechnical concerns.

- Individual projects are required to assess geotechnical hazards and mitigation on a site specific basis.

3. **Hydrology Impacts and Mitigation Provided by Plan Policy**

**Drainage & Flooding**

Development associated with the General Plan will increase surface runoff, could redirect it, result in higher peak flows and potentially cause flooding in areas having insufficient flood control facilities. Some development could occur in areas subject to the 100-year flood.

Impacts associated with drainage and flooding will be reduced to a level of less than significant, based on implementation of mitigation measures identified in the General Plan EIR and policies contained in the General Plan. Implementation of those policies by the City of Redlands will reduce the impacts to a level of less than significant based on information and analysis contained in the General Plan EIR and on the following facts:

- Guiding and Implementing Policies in the General Plan are designed to mitigate drainage and flooding impacts by restricting development in flood zones.

- Policies are included in the General Plan requiring more detailed hydrology studies for individual projects.

- The General Plan provides that a Master Drainage Plan be prepared for the entire Planning Area.

**Water Supply and Conservation**

The City of Redlands Public Works Department estimates the per capita consumption rate of domestic water for residents in the Planning Area to be 300 gallons per day (gpd). Applying this rate to the current estimated population of 66,301 yields approximately 19,890,300 gpd. Applying the same consumption rate to the projected 35,343 person population increase resulting from the ultimate development possible under the General Plan yields an additional 10,602,900 gpd. Total domestic water consumption at buildout is estimated to be 30,493,200 gpd.

Impacts associated with water supply and conservation will be reduced to a level of less than significant, based on implementation of mitigation measures identified in the General Plan EIR and policies contained in the General Plan. Implementation of those policies by the City of Redlands will reduce the impacts to a level of less than significant based on information and analysis contained in the General Plan EIR and on the following facts:

- Because agriculture land uses at General Plan buildout will be lessened, impacts on water demand for agriculture are considered less than significant.

- Impacts upon water supply are mitigable on a local level. General Plan policies address the need to preserve floodplains and open space areas for ground water recharge, and the need to preserve water supplies through recycling and conservation measures.

- Regional impacts may occur due to a number of factors and are beyond the control of the City.

**Water Quality**

Ultimate buildout under the General Plan may create an increase in urban runoff due to rainstorms and incidental runoff due to automobile washing, landscape irrigation and like water consumption activities. This runoff has the potential of contaminating groundwater due to pollutants associated with urban runoff. The use of treated waste water may also have an adverse effect on water quality by increasing the amount of Nitrate and Total Dissolved Solids (TDS) which percolate into ground water.

Impacts associated with water quality will be reduced to a level of less than significant, based on implementation of mitigation measures identified in the General Plan EIR and policies contained in the General Plan. Implementation of those policies by the City of Redlands will reduce the impacts to a level of less than significant based on information and analysis contained in the General Plan EIR and on the following facts:

- The existing federal N.P.D.E.S. program requires certain broad classes of industrial uses, as well as development projects over 5 acres, in size, to incorporate Best Management Practices (BMPs) to control pollutant discharge to the maximum extent practicable.

- Policies in the General Plan require adherence to the federal N. P.D. E. S. permit program and will mitigate the potential pollutant impacts of surface runoff.

- Those impacts associated with the use of treated waste water will be mitigated by incorporating BMP's into projects as required by federal law.

4. <u>**Mineral Resources Impacts and Mitigation Provided by Plan Policy**</u>

Mineral resources in the Planning Area consist primarily of sand and gravel construction aggregates used for making concrete and concrete products. The California Division of Mines and Geology (CDMG) estimates that approximately seven times the amount of construction aggregates in the San Bernardino Production-Consumption area exist to supply the region for the next 43 years. However, not all of these resources are

available as reserves, CDMG predicts a shortfall of construction aggregates over the next 35 years. There are approximately 5,000 acres of CDMG designated MRZ-2 Zone (identifies regionally significant resources) in the Planning Area. Of this 5,000 acres, 799 acres are presently designated as "reserves" where mining is permitted.

Impacts associated with mineral resources will be reduced to a level of less than significant, based on implementation of mitigation measures identified in the General Plan EIR and policies contained in the General Plan. Implementation of those policies by the City of Redlands will reduce the impacts to a level of less than significant based on information and analysis contained in the General Plan EIR and on the following facts:

- The General Plan preserves 87% of MRZ-2 lands (4,400 acres) and all reserve areas (799 acres). By limiting areas to be conserved to those within the Santa Ana River Wash, the General Plan prevents major land use conflicts that would result if all MRZ land were conserved.

- The General Plan protects mineral resources, provides for adequate local contribution to future regional needs, and contains policies to protect adjacent land use from impacts of mining.

5. **<u>Historical/Archaeological Resources Impacts and Mitigation Provided by Plan Policy</u>**

Approval of the General Plan will encourage development within the Planning Area which may potentially have an adverse impact on areas which have not been surveyed for archaeological resources. There is also the potential for adverse impacts on the City's existing historical and cultural resources.

Impacts associated with historical and archaeological resources will be reduced to a level of less than significant, based on implementation of mitigation measures identified in the General Plan EIR and policies contained in the General Plan. Implementation of those policies by the City of Redlands will reduce the impacts to a level of less than significant based on information and analysis contained in the General Plan EIR and on the following facts:

- Policies in the General Plan encourage preservation of known archaeological resources and any incidental discovery of artifacts during the course of development.

- The Land Use Plan does not propose intensification of land uses in historical areas.

- Policies in the General Plan serve to identify, maintain, protect, and enhance the City's cultural, historic, and architectural resources.

6. **Visual Resources Impacts and Mitigation Provided by Plan Policy**

The primary visual impact associated with implementation of the General Plan may be an increase in urban growth. Such growth may reduce the perception of Redlands as a free standing city dominated by agriculture and natural open space. It would permanently alter the visual character of the City from agriculture or open space to one of urban development, and is a potential significant adverse impact of the project.

Impacts associated with visual resources may be reduced to a level of less than significant, based on implementation of mitigation measures identified in the General Plan EIR and policies contained in the General Plan. Implementation of those policies by the City of Redlands will reduce the impacts to a level of less than significant based on information and analysis contained in the General Plan EIR and on the following facts:

- The Plan has policies for City design and historic and scenic preservation. These policies seek to retain the traditional town character by preserving historic architectural resources and minimizing intrusion of commercial development along residential arterial streets.
- General Plan policies limit development on hillsides, encourage landscaped medians and scenic overlooks, incorporate requirements to plant large-scale trees along arterials and encourage completion of the Santa Ana River blufftop scenic drive.
- The effects of light and glare are addressed by policies requiring attention to lighting design.

7. **Airport Safety Impacts and Mitigation Provided by Plan Policy**

The major potential impacts associated with airport planning are noise and the establishment of clear zones to minimize crash hazards. Noise projections for the proposed San Bernardino International Airport have not at this time been finalized, but preliminary forecasts indicate no adverse impacts for the Planning Area.

Impacts associated with airport safety will be reduced to a level of less than significant, based on implementation of mitigation measures identified in the General Plan EIR and policies contained in the General Plan. Implementation of those policies by the City of Redlands will reduce the impacts to a level of less than significant based on information and analysis contained in the General Plan EIR and on the following facts:

- Policies require coordination with the San Bernardino International Airport Authority as operations and flight patterns are further developed.

- A study of the Redlands Municipal Airport Master Plan has determined that noise and safety issues from this facility do not pose significant impacts on adjacent land uses as proposed by the Redlands General Plan.

8. **Wastewater Impacts and Mitigation Provided by Plan Policy**

Implementation of the General Plan will create additional demands on the existing sewer system due to potential increase in new residential, commercial, and industrial development in the Planning Area. The Wastewater Collection Master Plan is designed with a buildout population of 180,000 which is nearly twice the projected General Plan buildout population. Therefore, future treatment capacity is expected to be met.

Impacts associated with wastewater may be reduced to a level of less than significant, based on implementation of mitigation measures identified in the General Plan EIR and policies contained in the General Plan. Implementation of those policies by the City of Redlands will reduce the impacts to a level of less than significant based on information and analysis contained in the General Plan EIR and on the following facts:

- The Wastewater Collection Master Plan is designed with a buildout population of 180,000 which is nearly twice the projected General Plan buildout population.

- Development proposals in non-sewered sections of the Planning Area shall develop solutions for providing wastewater treatment to the City and Regional Water Quality Control Board.

9. **Parks Impacts and Mitigation Provided by Plan Policy**

The General Plan proposes over 400 acres of additional parkland within the Planning Area for a total of 753 acres. Assuming a buildout population of 101,644, more than 7 acres of parkland per 1,000 residents will exist which exceeds the City's goal of 5 to 6 acres of parkland per 1,000 residents.

Impacts associated with parks will be reduced to a level of less than significant, based on implementation of mitigation measures identified in the General Plan EIR and policies contained in the General Plan. Implementation of those policies by the City of Redlands will reduce the impacts to a level of less than significant based on information and analysis contained in the General Plan EIR on the following facts:

- The General Plan proposes over 400 acres of additional parkland, providing over 7 acres of parkland per 1,000 residents.

- General Plan policies prevent slopes and conservation areas from being developed.

10. **School Impacts and Mitigation Provided by Plan Policy**

Implementation of the General Plan may create additional demands on school facilities as a result of the construction of dwelling units in the Planning Area.

Impacts associated with schools will be reduced to a level of less than significant, based on implementation of mitigation measures identified in the General Plan EIR and policies contained in the General Plan. Implementation of those policies by the City of Redlands will reduce the impacts to a level of less than significant based on information and analysis contained in the General Plan EIR and on the following facts:

- School impacts are mitigated by the collection of state statutorily imposed development fees on all new construction.
- General Plan policies mitigate any impacts on school facilities, including improvement of facilities and better communication between the City and the School District in new school planning.
- The General Plan anticipates the construction of Redlands Unified School District's new High School and provides locations for additional elementary schools.

11. **Police Impacts and Mitigation Provided by Plan Policy**

Implementation of the General Plan may result in additional demand for police protection services due to the proposed increase in commercial and residential uses.

Impacts associated with police will be reduced to a level of less than significant, based on implementation of mitigation measures identified in the General Plan EIR and policies contained in the General Plan. Implementation of those policies by the City of Redlands will reduce the impacts to a level of less than significant based on information and analysis contained in the General Plan EIR and on the following facts:

- Police impacts are mitigated by the imposition of development impact fees to pay for needed new facilities.
- Police impacts are mitigated by revenue from property taxes and sales tax to pay for manpower and equipment.

12. **Fire Protection Impacts and Mitigation Provided by Plan Policy**

Implementation of the proposed Plan may create additional demands on existing fire protection services due to the increase in new residential and commercial structures in the

Planning Area. Additional impacts on fire services will be associated with development within the high fire hazard regions.

Impacts associated with fire protection will be reduced to a level of less than significant, based on implementation of mitigation measures identified in the General Plan EIR and policies contained in the General Plan. Implementation of those policies by the City of Redlands will reduce the impacts to a level of less than significant based on information and analysis contained in the General Plan EIR and on the following facts:

- Fire protection impacts are mitigated by the imposition of development impact fees to pay for needed new facilities.
- Fire protection impacts are mitigated by revenue from property taxes and sales tax to pay for manpower and equipment.
- The Plan has policies help prevent fires and reduce the potential for loss of lives, property and natural resources.

13. <u>**Emergency Management Impacts and Mitigation Provided by Plan Policy**</u>

Implementation of the General Plan may result in increased population which could expose additional people to hazards in the area.

Impacts associated with emergency management will be reduced to a level of less than significant, based on implementation of mitigation measures identified in the General Plan EIR and policies contained in the General Plan. Implementation of those policies by the City of Redlands will reduce the impacts to a level of less than significant based on information and analysis contained in the General Plan EIR and on the following facts:

- Policies identify the Redlands Emergency Disaster Plan as the guide for disaster planning and specify its ongoing revision to reflect any changes to the Plan area.

14. <u>**Waste Management Impacts and Mitigation Provided by Plan Policy**</u>

Buildout of the General Plan may result in an estimated increase of approximately 34,500 people to the Planning Area at buildout. This is anticipated to result in a net increase in the area's solid waste generation.

Impacts associated with waste management will be reduced to a level of less than significant, based on implementation of mitigation measures identified in the General Plan EIR and policies contained in the General Plan. Implementation of those policies by the City of Redlands will reduce the impacts to a level of less than significant based on information and analysis contained in the General Plan EIR and on the following facts:

- General Plan policies commit to a reduction in per capita waste generation and an increase in recycling.

- The Plan commits to compliance with AB 939 (California Integrated Waste Management Act of 1989) and subsequent amendments to the act.

15 **Electromagnetic Fields Impacts and Mitigation Provided by Plan Policy**

The major potential impact associated with electromagnetic fields is its potential effect on health. This potential health hazard has not been conclusively demonstrated but is being studied in relation to 220 kilovolt power lines or greater. Because these lines are currently located only in remote low density areas of the Planning Area, potential impacts are minimal.

Impacts associated with electromagnetic fields will be reduced to a level of less than significant, based on implementation of mitigation measures identified in the General Plan EIR and policies contained in the General Plan. Implementation of those policies by the City of Redlands will reduce the impacts to a level of less than significant based on information and analysis contained in the General Plan EIR and on the following facts:

- General Plan policies encourage support of research into the health effects of electromagnetic fields generated by power transmission lines and other sources and to take appropriate action if necessary.

## B. Significant Environmental Impacts Which Can Not Be Avoided Or Mitigated by the General Plan.

An objective of the General Plan is to implement well-designed policies which will avoid causing significant adverse environmental impacts. In this sense, the Plan is seen as "self-mitigating." Despite this goal, significant adverse environmental impacts remain, some attributable to implementation of the Plan, others as a result of regionally cumulative impacts.

The General Plan EIR concludes that the following environmental effects of implementation of the the General Plan can not be avoided or mitigated to a level of less than significant. Impacts in these areas will remain significant even with the implementation of General Plan policies and the mitigation measures contained in the General Plan EIR. Significant unavoidable environmental impacts identified in the General Plan EIR include those associated with open space, agricultural land, biotic resources, air quality, traffic, noise, and energy resources. Because these impacts are significant and unavoidable, they require the adoption of a Statement of Overriding Considerations if the project is to be approved.

1. **Open Space Impacts and Mitigation Provided by Plan Policy**

The General Plan proposes the conversion of about 9,000 acres of open space (i.e., vacant land, agriculture, flood control) to urban uses. Urban uses include Very Low, Low, Low-Medium, Medium High Density Residential, Office, Commercial, Industrial and Public/Institutional. With urbanization, loss of open space cannot be entirely avoided and is deemed to be an unavoidable significant adverse impact.

Policies in the General Plan Open Space Element as well as other elements provide reduction of potential open space impacts to the greatest extent possible, however the City finds that a significant impact will occur based on the following facts:

- The City of Redlands currently contains about 19,000 acres of open space.
- The General Plan anticipates the development of approximately 50% of these areas, replacing existing open space uses with urban uses.

The Statement of Overriding Considerations for the Redlands General Plan contains the facts and findings used to determine that this impact cannot be feasibly avoided.

2. **Agricultural Impacts and Mitigation Provided by Plan Policy**

Buildout of the General Plan may result in the conversion of about 4,700 acres of agriculture to urban land uses. Policies in the General Plan are intended to preserve the City's remaining 622 acres of Prime Agricultural Land, Unique Agricultural Land, and Agricultural Land of Statewide Importance at buildout. While continued urban expansion will create development pressures on agricultural lands, implementation of these policies will encourage preservation of agriculture.

Given the decline in citrus and other farmland in southern California and San Bernardino County, and despite implementation of specific General Plan policies, the loss of agricultural lands that would occur with implementation of the General Plan must be considered a significant unavoidable adverse impact. The City finds that a significant impact will occur based on the following facts:

- Buildout of the General Plan may result in the conversion of about 4,700 acres of agriculture to urban land uses.
- Urban expansion in Redlands and Southern California will create development pressures on agricultural lands.

The Statement of Overriding Considerations for the Redlands General Plan contains the facts and findings used to determine that this impact cannot be feasibly avoided.

3. **Biotic Resources Impacts and Mitigation Provided by Plan Policy**

Implementation of the proposed General Plan may reduce the amount of habitat available to wildlife due to conversion of agricultural land to urban uses and due to conversion of undeveloped land to urban uses. Policies in the General Plan which address conversion of agriculture and other habitat to urban uses include evaluation of habitat value prior to conversion and if found to be significant, consideration of incorporating similar habitat value into the project.

Specific biological resources in the Planning Area which are listed as endangered by state and federal agencies are two plants (Santa Ana River Wooly Star, Slender-Horned Spineflower) and one animal (Least Bell's Vireo). A third plant, Nevin's Barberry is listed only by the State as endangered. Another animal, the Stephen's Kangaroo Rat is listed as threatened by the State, while it is federally listed as endangered. Finally, two other animals listed as endangered are the Least Bell's Vireo (federal) and the Western Yellow Billed Cuckoo (State). Most of the Planning Area's valued habitat for rare, threatened or endangered species is designated as Flood Control, Resource Conservation, or Parks/Golf Courses on the proposed General Plan Map. In addition, General Plan policies specify coordination with appropriate agencies and jurisdictions to ensure preservation of valued habitat. These policies will serve as mitigation to reduce or avoid impacts to biotic resources.

Although policies will mitigate impacts due to implementation of the proposed General Plan, other concerns which could affect biotic resources include availability of surface water, introduction of domestic animals into or adjacent to natural habitat, and introduction of plant species invasive to native habitat. Biological surveys required by the General Plan assess the availability of surface waters and would require restoration or preservation of any wetlands. Requirements to provide buffers between structures and naturally occurring habitat can help mitigate impacts due to domestic animals. Policies in the General Plan expand the street tree list and require native vegetation in public areas. This will alleviate impacts due to introduction of exotic species.

Despite the General Plan's emphasis on conservation of biotic resources, the net loss of habitat due to implementation of the General Plan may contribute to the regional loss of habitat that has been taking place since urbanization of the San Bernardino Valley and southern California. These effects are deemed to be a significant unmitigable adverse impact unless all development is discontinued, which is not considered a viable option. The impact of biotic resources is considered significant based on the following facts:

- With the urbanization allowed by the proposed General Plan there will be a significant reduction in the amount of habitat available to wildlife.

- There are specific biological resources in the Planning Area which are listed as endangered by state and federal agencies.
- Implementation of the General Plan will result in other impacts that could affect biotic resources to include availability of surface water, introduction of domestic animals into or adjacent to natural habitat, and introduction of plant species invasive to native habitat.

The Statement of Overriding Considerations for the Redlands General Plan contains the facts and findings used to determine that this impact cannot be feasibly avoided.

4. **Air Quality Impacts and Mitigation Provided by Plan Policy**

Implementation of the General Plan may result in generation of additional pollutants from stationary sources (construction activities, electrical and natural gas usage) and mobile sources primarily from increased vehicular travel. Short-term impacts may result from construction activities due to site disturbance and emissions from construction equipment.

Numerous specific policies contained in the General Plan are designed to reduce vehicle trips by promoting TDM measures including carpooling, modified work schedules to reduce peak hour traffic, encouraging public transit and bicycling, parking management strategies which discourage single-occupancy vehicles, and planning for intra-regional and main line rail services. Additional policies encourage support of legislation which would reduce emissions and managing growth in order to achieve a balance of jobs and housing. Development will be designed in a manner to minimize direct and indirect emissions of air contaminants. There are also policies which require adoption of procedures and regulations which minimize particulate emissions during construction activities. Measures which promote energy conservation to minimize stationary source emissions are also included.

By incorporating AQMP measures and policies in the General Plan, the City has committed to improving air quality through its community planning and development process on a local level. Plan policies will provide adequate mitigation and no unmitigable significant adverse impacts related to climate, air quality, and wind are anticipated as a result of implementation of the General Plan. However, air quality impacts on a regional level remain a concern due to continued exceedance of state and federal standards and therefore air quality is considered significant based on the following facts:

- Despite the plan policies expected to mitigate air quality impacts, Redlands will continue to add pollutants to the South Coast Air Basin. The addition of pollutants to a Basin which does not comply with federal or state air quality standards is considered a significant impact.

The Statement of Overriding Considerations for the Redlands General Plan contains the facts and findings used to determine that this impact cannot be feasibly avoided.

5. **Traffic Impacts and Mitigation Provided by Plan Policy**

Implementation of the General Plan may result in significant traffic impacts despite the roadway improvements specified in the Circulation Element. Direct impacts as a result of the General Plan could include an increase in average daily trips, impacts to residential units fronting onto arterials and high volume traffic on residential collector streets. Traffic level of service may be E or F on several arterial street segments and on segments of Interstate-10 and State Route 30.

Policies in the Circulation Element will reduce impacts caused by implementation of the General Plan and include maintaining an LOS C or better, monitoring traffic levels of service, implementing roadway improvements, reviewing the Circulation Network with neighboring jurisdictions, coordinating freeway and highway requirements with Caltrans, levying fees on new developments for roadway improvements, keeping certain roadway classifications below specified average daily trip volumes, supporting the Congestion Management Program of San Bernardino County, establishing a comprehensive network of bicycle and pedestrian routes and developing the airport utilizing the 1993 Municipal Airport Master Plan.

Although policies included in the Circulation Element provide various types of mitigation measures to reduce impacts on traffic, implementation of the General Plan may result in significant unavoidable adverse impacts based on the following facts:

- Traffic level of service would be E or F on eleven arterial street segments and on segments of Interstate 10 and State Route 30 despite roadway improvements specified in the Circulation Element.

- Direct impacts as a result of the General Plan would include an increase in average daily trips, impacts to residential units fronting onto arterials and high volume traffic on residential collector streets.

The Statement of Overriding Considerations for the Redlands General Plan contains the facts and findings used to determine that this impact cannot be feasibly avoided.

6. **Noise Impacts and Mitigation Provided by Plan Policy**

Noise sources in the Planning Area will include general vehicle traffic, the Southern Pacific (SP) and possibly from Metro-Link (formerly the Atchison, Topeka and Santa Fe (AT&SF) Railroad) railroads, the Redlands Municipal Airport, and short term construction noise.

Implementation of the General Plan may generate 1.01 million daily vehicle trips, thus increasing traffic noise in the area. Trains passing through the City may also cause noise impacts. Southern Pacific has a line which runs through the southern portion of the City and is estimated that 40 trains per day use this. These facilities may cause impacts to residential dwellings in the vicinity. Additional impacts may be associated with the Redlands Municipal Airport due to overflights as a result of airport operations. Although noise impacts caused by construction may occur throughout General Plan buildout, they are anticipated to be short term and can be mitigated as discussed below.

Numerous specific policies contained in the General Plan will reduce noise by promoting noise abatement measures including installing sound walls, insulation, berms, and landscaping. Development is encouraged to be designed in a manner that will minimize direct and indirect noise impacts. Policies in the General Plan will mitigate impacts to roadways within the Planning Area and briefly include maintaining level of service C or better within the East Valley Corridor and at all intersections, monitoring traffic levels and implementing the Circulation Element improvements, developing Transportation Demand Management programs to reduce vehicle miles traveled, street widening (from 2 to 4 lanes and 4 to 6 lanes) and construction of new roads, developing alternate forms of transportation, coordinating with Caltrans on freeway and highway improvements, acquiring additional right-of-ways for street widening, and developing safe pedestrian paths and bikeways.

Impacts caused by the Redlands Municipal Airport are mitigated by the airport's Master Plan which shows existing and future noise contours and General Plan policies which maintain compatibility of airport operations with development in the surrounding area. Other policies require use of aircraft noise abatement measures for departure of aircraft and limiting land uses within the projected 65 CNEL Db contour to agriculture, open space and light industry.

Because residential uses are not situated close to the railroad lines, no project related increases in railroad noise impacts are anticipated. Areas with potential noise impacts due to traffic can be mitigated with noise barriers including sound walls and landscaping. Short term impacts from construction noise can be mitigated by policies which limit the hours of operation for all construction or demolition projects. There are also policies which require adoption of procedures and regulations which minimize noise during construction activities.

By incorporating noise abatement measures in the General Plan, the City has committed to reducing noise levels through its community planning and development process. However, full mitigation of noise increases greater than 4dB resulting in excess of 65 CNEL in residential areas is not likely to be provided at some locations, and not feasible where the noise source will be an aircraft or a freeway without sound walls that creates a line of sight barrier. Based on this information and the following facts, noise impact is considered a significant impact:

- Full noise mitigation is not feasible where the noise source will be an aircraft or a freeway.

The Statement of Overriding Considerations for the Redlands General Plan contains the facts and findings used to determine that this impact cannot be feasibly avoided.

7. **Energy Impacts and Mitigation Provided by Plan Policy**

Buildout under the proposed General Plan update may result in an increase in the consumption of electricity and natural gas in residential, commercial and industrial buildings. The actual demand for energy resources will vary depending on the type of energy systems incorporated into the building design and the degree of its usage as a primary energy source. Although the increase in energy consumption appears to be substantial, local energy suppliers have stated that the Planning Area can continue to be serviced from facilities within the area. Should the demand for energy services exceed supply, the utility companies have indicated that they would expand to meet the demand. This service would be in accordance with the company's extension rules on file with the California Public Utilities Commission at the time contractual agreements are made.

Although energy resource impacts do not appear to be significant, several policies in the Open Space Element of the General Plan identify conservation of scarce or non-renewable energy resources, encouraging the use of alternative resources, and support of San Bernardino County's energy-related policies and energy efficiency measures.

While numerous policies relative to energy conservation are included in the General Plan, energy consumption related to buildout may still have a significant unavoidable adverse impact on supplies of non-renewable energy resources and therefore this impact is considered significant based on the following facts:

- Development of the City of Redlands in accordance with the General Plan will cumulatively reduce supplies of non-renewable energy resources.

The Statement of Overriding Considerations for the Redlands General Plan contains the facts and findings used to determine that this impact cannot be feasibly avoided.

## C. ALTERNATIVES TO THE PROPOSED PROJECT.

Alternatives to the project are discussed in Section 19 of the EIR entitled "Alternatives to the Proposed Project." The City has considered the four project alternatives identified in the EIR in approving the project, and makes the following findings regarding those alternatives:

1. No Project Alternative (Existing General Plan)

This alternative assumes buildout of the Redlands Planning Area under the existing City of Redlands General Plan adopted in 1972. It also assumes buildout under the San Bernardino County General Plan (adopted in 1989 with revisions in 1993) for all unincorporated portions of the Planning Area. Development under this alternative would result in a total of 38,221 residential units, 8,924,780 square feet of commercial uses, 8,397,140 square feet of office, and 29,474,520 square feet of industrial uses within the project area at buildout.

In rejecting this alternative, the City Council makes the following findings:

- The proposed General Plan provides for a comprehensive and updated plan with policies which are internally consistent and in conformance State law and with regional plans and policies. The existing General Plan has been amended numerous times since 1972. As a result there are numerous inconsistencies among General Plan policies which would not be remedied by foregoing an update of the General Plan.

- The proposed General Plan incorporates a Housing Element which conforms with State Law and is consistent with the remainder of the General Plan. The existing General Plan's Housing Element may not be in compliance with State Law.

- The proposed General Plan is based on the most recent data available to the City and reflects the current policy of the City Council. The existing General Plan is out of date, is based on old and unreliable information, and does not reflect current policies of the City Council.

2. No Development Alternative (Existing Land Use Conditions Only)

This alternative assumes no further development in the project area above 1995 conditions and provides a baseline for environmental analysis. Existing residential units and non-residential structural square feet are 26,906 and 8,824,690, respectively.

In rejecting this alternative, the City Council makes the following findings:

- The proposed general plan increases the amount of land designated for residential, commercial and industrial development, providing additional tax revenues and substantially more employment opportunities than a no development alternative.

- The proposed general plan allows the City to satisfy regional goals for the provision of a fair share of housing to residents of all economic levels which would not be satisfied under the no development alternative.

- The proposed general plan allows the City to satisfy regional goals for the provision of jobs/housing balance by incorporation of the employment area of the EVCSP which would not be satisfied under the no development alternative.

3. Reduced Development Alternative (25% Reduction of Density/Intensity Across Entire Planning Area)

This alternative reduces density of potential new development, as proposed under Alternative #1 throughout the project area by 25% (i.e., the whole project area under proposed City General Plan). Adoption of this alternative would result in a reduction of significant impacts not mitigated by the General Plan. Development under this alternative would result in 27,311 residential units and 30,252,000 non-residential structural square feet within the project area at buildout.

In rejecting this alternative, the City Council makes the following findings:

- The proposed general plan provides for a major regional employment center that will assist in the regional need for a more balanced ratio between jobs and housing. Under the reduced development alternative the number of jobs created would be reduced and policies associated with the economic development of the community would not be met.

- A large portion of the new development expected to occur in the City was previously approved, either by the County of San Bernardino or the City of Redlands (East Valley Corridor Specific Plan); property owners and businesses have relied on prior actions for long range use of their property.

- The proposed General Plan allows the City to satisfy regional goals for the provision of a fair share of housing to residents of all economic levels. The reduced development alternative will reduce the potential for residential development in the City and in the region.

4. Reduced Traffic Alternative (Employment and Retail/Residential balance)

To achieve a closer local balance between housing and employment/shopping opportunities (and thus a reduction in traffic and elimination of most LOS deficiencies), this scenario assumes a 69 percent reduction in retail square footage and a 37 percent reduction in office and industrial square footage from the proposed General Plan. The land area resulting from this reduction is assumed to support about 2,400 housing units assuming a density of 2.7 dwelling units per acre.

In rejecting this alternative, the City Council makes the following findings:

- The proposed general plan provides for a major regional employment center that will assist in the regional need for a more balanced ratio between jobs and housing. Under the reduced traffic alternative the number of jobs created would be reduced and policies associated with the economic development of the community could not be met.

- A large portion of the new development expected to occur in the City was previously approved, either by the County of San Bernardino or the City of Redlands (East Valley Corridor Specific Plan). Property owners and businesses have relied on prior actions for long range use of their property.

**EXHIBIT "B"**

# CITY OF REDLANDS
# STATEMENT OF OVERRIDING CONSIDERATIONS
# FOR ENVIRONMENTAL IMPACT REPORT OF THE REDLANDS GENERAL PLAN

## A. INTRODUCTION

Pursuant to the State CEQA Guidelines, Section 15093, and to the extent that any impacts from adoption of the General Plan (the "Project") are significant and have not been mitigated to a level of insignificance, the City of Redlands adopts and makes the following Statement of Overriding Considerations regarding the potential unavoidable significant environmental impacts of the Project and the anticipated economic, social, and other benefits or considerations of the project.

## B. GENERAL

The City of Redlands finds that, to the extent that any impacts (including, without limitation, any cumulative impacts) attributable to the Project remain unmitigated or are considered to be unavoidable, such impacts are acceptable in light of the overriding social, economic, and other benefits or considerations described herein.

The City of Redlands also finds that the Project alternatives that would avoid or further mitigate the environmental effects identified by the environmental documentation in the record are infeasible or undesirable with respect to the Project. Such alternatives would impose limitations and restrictions on the growth of the City, which the City finds would prohibit or limit obtaining the specific social, economic, and other benefits or considerations of the Project.

## C. SOCIAL, ECONOMIC AND OTHER CONSIDERATIONS

### 1. Housing

Adoption of the proposed General Plan will greatly enhance the housing opportunities for existing and future residents of Redlands, both in terms of supply and affordability. Housing projections contained in the General Plan Land Use and Housing Elements are consistent with regional growth projections and meet requisite state mandated housing goals.

### 2. Employment

Development in accordance with the proposed General Plan will provide substantial employment opportunities to Redlands and has been found to be in accordance with the Southern California Association of Governments goal of achieving a jobs/housing balance for each community and region.

### 3. Infrastructure/Public Facilities Planning

Redlands has been planning for growth since it first incorporated. The most significant planning efforts occurred during the 1980's. In 1985 the firm of Camp Dresser and McKee Inc. concluded its work on the Wastewater Collection System Master Plan for the Redlands Planning area. In 1989 after ten years of study, the City of Redlands adopted the East Valley Corridor Specific Plan. This Plan incorporated a number of infrastructure/public facilities master plans and studies prepared jointly by the County of San Bernardino, City of Redlands, and City of Loma Linda in the areas of water, sewer, wastewater treatment/sludge management, drainage, transportation, fire services, law enforcement, schools, parks and recreation, hospitals and emergency services, library services, and fiscal impacts to determine if public facilities could be provided and financed to accommodate projected growth.

## D. ADDITIONAL OVERRIDING CONSIDERATIONS

Following is a summary of each of the significant unavoidable impacts of the Project and a description of the overriding considerations for each of the unavoidable, significant impacts.

### 1. Open Space.

Significant Unavoidable Adverse Impact

Conversion of open space to urban uses

Overriding Considerations

Projected urban growth will result in the reduction of open space. Currently the City contains approximately 19,000 acres of open space and the General Plan proposes the retention of 10,042 acres of open space lands including parks, agricultural lands, flood control/habitat conservation, resource conservation, and open space lands. While it is not possible to mitigate this impact to a level of insignificance, approval of the proposed General Plan and adoption of the recommended mitigation measures would provide local action in regard to this issue. In addition to maintaining over 30 percent of the land area in open space, specific mitigation measures adopted for the Project include:

- Encourage preservation of natural areas within and outside the Planning Area as regional parks or nature preserves.
- Seek any available State and federal grant assistance in implementing the parks and open space proposals of the General Plan.
- Preserve, protect, and enhance natural communities of special status.
- Preserve, protect and enhance wildlife corridor and riparian corridors throughout the Planning Area.

- Retain the maximum feasible amount of agricultural open space for its contributions to the local economy, lifestyle, air quality, habitat value, and sense of Redlands' heritage.

- Employ the General Plan Land Use Map and zoning to maintain agricultural and rural living uses to maintain citrus and other croplands in production.

Conclusion

Based upon the previously described social, economic, and other benefits or considerations of the Project and the additional overriding considerations described above, the benefits of the proposed Project outweigh the impact related to the loss of open space and any adverse environmental effects associated with this impact are considered to be acceptable.

**2. Agricultural.**

Significant Unavoidable Adverse Impact

Conversion of designated prime farm land to urban uses.

Overriding Considerations

Projected urban growth will result in the reduction of producing agricultural land. While it is not possible to mitigate this impact to a level of insignificance, approval of the proposed General Plan and adoption of the recommended mitigation measures would provide positive local action in regard to this issue. Mitigation measures related to agricultural land include General Plan policies to keep land in agricultural production as long as possible and provisions for the long-term preservation of agriculture (622 acres) and other open space lands.

Conversion of agricultural land within the future growth areas will not occur immediately. The General Plan is intended to provide enough land for development over the next 20 years. Therefore, as opposed to a specific development project, it is likely that a substantial amount of land within the future growth areas will remain in agricultural production for many years.

Specific mitigation measures associated with retention of agricultural lands include the following General Plan policies:

- Retain the maximum feasible amount of agricultural open space for its contributions to the local economy, lifestyle, air quality, habitat value, and sense of Redlands' heritage.

- Employ the General Plan Land Use Map and zoning to maintain agricultural and rural living uses to maintain citrus and other croplands in production.

Conclusion

Based upon the previously described social, economic, and other benefits or considerations of the Project and the additional overriding considerations described above, the benefits of the proposed Project outweigh the impact related to agricultural resources and any adverse environmental effects associated with this impact are considered to be acceptable.

**3. Biotic Resources.**

Significant Unavoidable Adverse Impact

Loss of habitat for plant and animal species (regional and cumulative impact issue).

Overriding Considerations

Approximately 30 percent of the total area of the City (10,042 acres) is being retained as open space under the proposed General Plan, including Parkland (901 acres), Agriculture (622 acres) Flood Control/habitat conservation (4,413 acres), Resource Conservation (3,956 acres), and Open Space (150 acres).

Some of the biotic resource mitigation measures for the proposed General Plan include:

- Preserve, protect, and enhance natural communities of special status.
- Preserve, protect, and enhance wildlife corridors connecting the San Bernardino National Forest, Santa Ana River Wash, Crafton Hills, San Timoteo/Live Oak Canyons, the Badlands, and other open space areas.
- Prepare a Master Biotic Management Plan.
- Require a biological assessment of any proposed project site where species or the habitat of species defined as sensitive or special status by the Department of Fish and Game or the U.S. Fish and Wildlife Service might be present.
- Enhance and restore the Zanja and tributary drainages as riparian corridors, where feasible, to provide habitat as well as recreational and aesthetic value.
- Coordinate with Riverside County, City of Yucaipa, Crafton Hills Conservancy and other agencies on maintaining open space and habitat conservation.
- Expand the City's Official Street Tree List to incorporate native trees.

Conclusion

Based upon the previously described social, economic, and other benefits or considerations of the Project and the additional overriding considerations described above, the benefits of the proposed Project outweigh the impact related to biotic resources and any adverse environmental effects associated with this impact are considered to be acceptable.

### 4. Air Quality

Significant Unavoidable Adverse Impact

Worsening of local and regional air quality problems.

Overriding Considerations

A significant air quality problem exists now in San Bernardino County which will persist for a number of years whether or not there is any significant growth in the Redlands area.

As a practical matter, continuing urban growth is likely in San Bernardino County irrespective of whether the proposed General Plan is adopted, as there are a number of other communities in the County with the ability to grow. Air quality is a regional problem that does not respect jurisdictional boundaries. Continuing urban growth, whether it occurs in Redlands or in other areas, will contribute to the regional air quality problem in roughly the same manner. The adoption of the proposed General Plan mitigation measures would provide positive action toward a comprehensive strategy to deal with the issue.

The General Plan incorporates goals and policies within the Health and Safety Element pertaining to Air Quality. These policies incorporate the majority of the goals, policies, and programs identified in the San Bernardino County Model Air Quality Element. Some of the significant mitigation measures recommended for air quality include the following:

- Participate with SANBAG in defining and implementing the Congestion Management Program (CMP) for San Bernardino County to ensure appropriate coordination with air quality planning.
- Reduce vehicle miles traveled and peak period auto travel by increasing average vehicle ridership during peak commute hours.
- Cooperate in efforts to expand bus, rail and other forms of mass transit.
- Promote non-motorized transportation.
- Utilize parking management strategies to discourage single occupancy vehicle usage.

- Promote the development of Park and Ride lots.

- Improve the balance between jobs and housing in order to create a more efficient urban form.

- Locate and design new development in a manner that will minimize direct and indirect emission of air contaminants.

- Establish and implement a Transportation Demand Management Program.

The Transportation Demand Management Program may include:

- Car and vanpooling among employees;
- Staggered work hours and/or flex time to alleviate peak traffic congestion;
- Subscription bus service to major traffic generators and events; and
- Preferential employee parking for car and vanpools.

Additionally, the land use pattern of the proposed General Plan is designed to minimize the number and length of vehicular trips by providing an appropriate balance and locational placement of land for housing, shopping, employment, educational, and recreational facilities.

Conclusion

Based upon the previously described social, economic, and other benefits or considerations of the project and the additional overriding considerations described above, the benefits of the proposed project outweigh the impact related to air quality and any adverse environmental effects associated with this impact are considered to be acceptable.

**5. Traffic.**

Significant Unavoidable Adverse Impact

Capacity deficiencies (unacceptable Level of Service) on the following arterial streets , collector streets, and freeways:

Arterials.

San Bernardino Ave from Alabama to Orange, LOS C-E
Lugonia Avenue from Alabama to Orange, LOS E
Redlands Blvd from Alabama to Colton, LOS E
California Street from Lugonia to Redlands Blvd., LOS B-F
Alabama Street from San Bernardino to Redlands Blvd., LOS D-F
Tennessee Street from Lugonia to Brookside, LOS A-E
Texas from Pioneer to Colton, LOS B-E
Center from Brookside to Highland, LOS C-E

Cajon Street from Citrus to Highland, LOS B-E
Mountain View Avenue from Lugonia to Interstate 10, LOS E

Collectors.

Pioneer from Alabama to Texas, LOS E-F

Freeways.

San Bernardino Freeway (I-10) from Mountain View to Live Oak Canyon Road, LOS E-F.

State Route 30 from Pioneer to Fifth, LOS E

Overriding Considerations

The traffic analysis presented in the EIR is a worst-case computer model analysis which assumes full development of the land uses designated in the proposed General Plan Land Use/Circulation Maps in the year 2010. Such models are an important tool in predicting the long-term theoretical impacts of large program documents such as the General Plan. In reality, all land affected in the proposed General Plan will not be developed; there will be a number of vacant, bypassed parcels, and it would take longer than the year 2010 for the proposed General Plan to approach buildout. Projections for buildout of the East Valley Corridor Specific Plan Area have identified time frames extending out as far as the year 2050.

Instead of recommending additional road construction which is increasingly difficult, costly, and infeasible to implement, the proposed General Plan emphasizes using the existing system more efficiently. Through policies of the General Plan (Section 5.20) it is the intent to monitor traffic growth and levels of service and to make changes as needed to maintain an acceptable level of service in the future. These changes may include traffic demand management strategies, traffic control measures, and land use and intensity changes.

The proposed General Plan also incorporates policies and implementation programs related to interchange improvements on the freeway system, increased public transit, traffic signal synchronization, and a bicycle facilities master plan.

Conclusion

Based upon the previously described social, economic, and other benefits or considerations of the Project and the additional overriding considerations described above, the benefits of the proposed Project outweigh the impact related to traffic and any adverse environmental effects associated with this impact are considered to be acceptable.

**6. Noise.**

Significant Unavoidable Adverse Impact

Noise increases greater than 4dB CNEL resulting in excess of 65 CNEL in residential areas where the noise source is from an elevated or very loud transportation source.

Overriding Considerations

Implementation of the General Plan will generate 1.01 million daily vehicle trips, thus increasing noise in the area. Other transportation noise sources such as airplanes and trains may also cause noise impacts. The Southern Pacific Railroad Company has a line which runs through the southern portion of the City and it is estimated that 40 trains per day use this route. These transportation facilities may cause impacts to residential dwellings in the vicinity.

The General Plan does incorporate measures which mitigate the extent or severity of noise impacts. Some of the mitigation measures are:

- Limit land use within the projected CNEL 65 dB contour of the Redlands Airport to agriculture, open space, golf course, and light industry.
- Support measures to reduce noise emissions by motor vehicles, aircraft, and trains.
- Adopt and enforce a Community Noise Ordinance to control non-transportation noise impacts.
- Require a noise impact evaluation based on noise measurements at the site for all projects in Noise Referral Zones.
- Require the inclusion of noise mitigation measures in the design of new roadway projects.
- Require mitigation to ensure that indoor noise levels for residential living spaces not exceed 45 dB LDN/CNEL due to the combined effect of all exterior noise sources.

Despite these mitigation measures and others it is anticipated that certain properties will be subjected to noise levels that can not be mitigated to a level of insignificance, particularly in the vicinity of raised freeways.

Conclusion

Based upon the previously described social, economic, and other benefits or considerations of the Project and the additional overriding considerations described above, the benefits of the proposed Project outweigh the impact related to noise and any

adverse environmental effects associated with this impact are considered to be acceptable.

**7. Energy Resources.**

Significant Unavoidable Adverse Impact

Development of the City of Redlands in accordance with the General Plan will cumulatively reduce supplies of non renewable energy resources.

Overriding Considerations

Buildout under the proposed General Plan will result in an increase in the consumption of electricity and natural gas in residential, commercial and industrial buildings. Although the increase in energy consumption appears to be substantial, local energy suppliers have stated that the Planning Area can continue to be serviced from facilities within the area.

Policies within the Open Space Element of the General Plan identify conservation of scarce or non-renewable energy resources, encouraging the use of alternative resources and support of San Bernardino County's energy-related policies and energy efficiency measures.

Even with these policies incorporated in the General Plan, energy consumption related to buildout will still have a significant unavoidable adverse impact on supplies on non-renewable resources.

Conclusion

Based upon the previously described social, economic, and other benefits or considerations of the Project and the additional overriding considerations described above, the benefits of the proposed project outweigh the impact related to energy resources and any adverse environmental effects associated with this impact are considered to be acceptable.

# *CITY OF REDLANDS*

# *MASTER ENVIRONMENTAL ASSESSMENT*

## *GENERAL PLAN UPDATE*

**OCTOBER 1995**


Prepared for:

City of Redlands
Community Development Department
35 Cajon Street
Redlands, California 92373
(909)798-7555

Prepared by:

Smith, Peroni & Fox, Planning Consultants, Inc.
960 East Tahquitz Canyon Way, Suite 103
Palm Springs, California 92262

Blayney Dyett Greenberg
70 Zoe Street
San Francisco, California 94107

## TABLE OF CONTENTS


| | | | | PAGE |
|---|---|---|---|---|
| 1.0 | INTRODUCTION | | | 1 |
| 2.0 | LAND USE | | | 1 |
| 3.0 | OPEN SPACE | | | 1 |
| | 3.1 | State Planning Law Open Space Categories | | 1 |
| | 3.2 | General Plan Open Space Categories | | 1 |
| | 3.3 | Past Open Space Planning Efforts | | 2 |
| | 3.4 | Concurrent Open Space Planning Efforts | | 2 |
| | 3.5 | Existing Open Space Acreages | | 3 |
| 4.0 | SEISMICITY, GEOLOGY, AND SOILS | | | 1 |
| | 4.1 | Geology and Soils | | 2 |
| | | 4.1.1 | Regional Structural Geologic Setting | 2 |
| | | 4.1.2 | Planning Area Structural Geologic Setting With Geologic Units | 3 |
| | | 4.1.3 | Principal Geotechnical Hazards (Impacts) and Constraints | 7 |
| | 4.2 | Faulting and Seismicity | | 12 |
| | | 4.2.1 | Regional Faulting and Seismic Setting | 12 |
| | | 4.2.2 | Fault Systems and Seismicity | 15 |
| | | 4.2.3 | Principal Seismic Hazards (Impacts) and Constraints | 20 |
| | | 4.2.4 | Earthquake Preparedness | 26 |
| 5.0 | AGRICULTURAL LANDS | | | 1 |
| 6.0 | HYDROLOGY | | | 1 |
| | 6.1 | Drainage | | 1 |
| | 6.2 | Flooding | | 2 |
| | 6.3 | Water Supply and Conservation | | 11 |
| | 6.4 | Water Quality | | 15 |
| 7.0 | BIOTIC RESOURCES | | | 1 |
| | 7.1 | Regional Setting, Habitat Types, and Corridors | | 1 |
| | 7.2 | Special Status Species | | 2 |
| | 7.3 | "Common" Species and Habitats | | 13 |
| 8.0 | MINERAL RESOURCES | | | 1 |
| | 8.1 | Mineral Resource History and State Designations | | 1 |
| | 8.2 | Impacts of Mining and Construction Aggregate Processing | | 5 |
| 9.0 | CLIMATE, AIR QUALITY, AND WIND | | | 1 |
| | 9.1 | Climate | | 1 |
| | 9.2 | Air Quality | | 1 |
| | 9.3 | Wind | | 11 |
| 10.0 | HISTORIC, ARCHAEOLOGIC, AND PALEONTOLOGIC RESOURCES | | | 1 |
| | 10.1 | Historic Resources | | 1 |
| | 10.2 | Archaeologic and Paleontologic Resources | | 2 |

| | | PAGE |
|---|---|---|
| 11.0 | VISUAL QUALITY | 1 |
| | 11.1 Visual Setting Elements | 1 |
| 12.0 | TRAFFIC | 1 |
| | 12.1 Related Environmental Evaluations | 1 |
| | 12.2 Existing Conditions | 1 |
| | 12.3 Programmed and Planned Improvements | 4 |
| | 12.4 Plans and Programs | 4 |
| 13.0 | AIRPORT SAFETY | 1 |
| 14.0 | NOISE | 1 |
| | 14.1 Fundamentals of Noise | 1 |
| | 14.2 Harmful Effects of Noise | 3 |
| | 14.3 Community Responses to Sound | 3 |
| | 14.4 Land Use Compatibility with Noise | 4 |
| | 14.5 Existing Traffic Noise Levels | 4 |
| 15.0 | COMMUNITY SERVICES | 1 |
| | 15.1 Water | 1 |
| | 15.2 Sewer | 1 |
| | 15.3 Parks | 2 |
| | 15.4 Schools | 4 |
| | 15.5 Police | 9 |
| | 15.6 Fire | 10 |
| | 15.7 Emergency Management | 13 |
| | 15.8 Waste Management and Recycling | 15 |
| 16.0 | ENERGY | 1 |
| 17.0 | ELECTROMAGNETIC FIELDS | 1 |

LIST OF FIGURES


| | PAGE |
|---|---|
| MEA Figure 1.1, Index to Environmental Documents | 2 |
| MEA Figure 1.2, Regional Location | 3 |
| MEA Figure 1.3, Planning Boundaries | 4 |
| MEA Figure 1.4, Planning Sectors and Traffic Analysis Zones | 5 |
| MEA Figure 2.1, Existing Land Use | 6 |
| MEA Figure 2.2, City of Redlands Existing General Plan Land Use | 9 |
| MEA Figure 2.3, County Existing General Plan Land Use | 10 |
| MEA Figure 2.4, Proposed General Plan Land Use Diagram | 13 |
| MEA Figure 4.1, Regional Generalized Geologic Map | 4 |
| MEA Figure 4.2, Generalized Geologic Map | 5 |
| MEA Figure 4.3, Generalized Erosion Potential | 9 |
| MEA Figure 4.4, Landslide Potential | 11 |
| MEA Figure 4.5, Expansion Potential | 13 |
| MEA Figure 4.6, Fault Rupture Hazards | 16 |
| MEA Figure 4.7, Seismicity Map | 18 |
| MEA Figure 4.8, M4.0 or Greater Seismicity Map | 19 |
| MEA Figure 4.9, Generalized Liquefaction Potential | 24 |
| MEA Figure 5.1, Agricultural Preserves | 2 |
| MEA Figure 5.2, Agricultural Lands | 4 |
| MEA Figure 6.1, San Timoteo Creek Project | 5 |
| MEA Figure 6.2, Mission-Zanja System | 6 |
| MEA Figure 6.3, Dam Inundation Areas | 9 |
| MEA Figure 6.4, Flood Zones | 10 |
| MEA Figure 7.1, Biotic Resources | 6 |
| MEA Figure 8.1, San Bernardino Production-Consumption Region and Mineral Resource Zones | 2 |
| MEA Figure 8.2, Regionally Significant Construction Aggregate Resource Areas in the San Bernardino Production/Consumption Region | 4 |
| MEA Figure 10.1, Archaeological Resource Sensitivity Map | 4 |
| MEA Figure 12.1, Trafficway Network | 2 |
| MEA Figure 13.1, Existing Airside Facilities | 2 |
| MEA Figure 13.2, Existing Landside Facilities | 3 |
| MEA Figure 14.1, Land Use Compatability for Community Noise Environments | 5 |
| MEA Figure 14.2, Existing Noise 1994 | 6 |
| MEA Figure 15.1, Conceptual Fire Hazard Areas | 11 |

LIST OF TABLES

| | PAGE |
|---|---|
| MEA Table 2.1, Existing Land Uses | 5 |
| MEA Table 2.2, Existing Land Uses Incorporated, Sphere, and County Territory | 7 |
| MEA Table 2.3, Land Use Under Existing General Plans | 11 |
| MEA Table 3.1, Vacant and Open Space Lands Under Existing Conditions | 3 |
| MEA Table 4.1, Summary Checklist of Geotechnical and Seismic Hazards | 2 |
| MEA Table 4.2, Modified Mercalli Intensity Scale | 22 |
| MEA Table 6.1, City of Redlands Water Conservation Plan | 14 |
| MEA Table 7.1, Rare, Threatened, or Endangered Species and (etc.) | 3 |
| MEA Table 7.2, Global and State Rankings Identified by the CNDDB within the Planning Area | 7 |
| MEA Table 7.3, Selected Organizations and Agencies interested in Redlands Planning Area Species and Open Space preservation, and Who May Provide Species Inventory Lists | 13 |
| MEA Table 7.4, Documents Containing Species Inventories or Species Discussions Relevant to the Redlands Planning Area | 14 |
| MEA Table 7.5, City of Redlands Official Street Tree List | 16 |
| MEA Table 8.1, Summary Checklist of Mineral Resource Environmental Concerns | 1 |
| MEA Table 8.2, Projected Aggregate Consumption for San Bernardino Production-Consumption Region | 6 |
| MEA Table 8.3, Aggregate Resources of the San Bernardino Production-Consumption Region | 7 |
| MEA Table 8.4, Mineral Resource Zones within the Redlands Planning Area | 8 |
| MEA Table 9.1, Ambient Air Quality Standards | 3 |
| MEA Table 9.2, Percent of Days Exceeding Federal Standards and Maximum Concentrations, 1994 | 4 |
| MEA Table 9.3, San Bernardino County Share of 1985 Pollution Emissions in the South Coast Air Basin | 7 |
| MEA Table 9.4, South Coast Air Basin Emissions Inventory and Future Projections - Baseline Case | 8 |
| MEA Table 9.5, San Bernardino County Major Pollutant Sources as Shares of Pollutant Emissions | 9 |
| MEA Table 9.6, San Bernardino County Significant Wind Events, 1980-1988 | 12 |
| MEA Table 14.1, Existing Exterior Noise Exposure | 7 |
| MEA Table 15.1, Redlands Unified School District Elementary School Capacity and Enrollment | 5 |
| MEA Table 15.2, Redlands Unified School District Middle and High School Capacity and Enrollment Existing Conditions | 6 |
| MEA Table 15.3, Redlands Area Fire Stations | 12 |
| MEA Table 16.1, Existing Electricity Consumption | 1 |
| MEA Table 16.2, Existing Natural Gas Consumption | 2 |

# 1.0 INTRODUCTION

Redlands General Plan / MEA

# 1.0 INTRODUCTION

**Purpose and definition of the MEA.** The Master Environmental Assessment (MEA) for the City of Redlands General Plan provides an information base that is intended to serve four functions:

- Provide supporting data for guiding and implementing policies of the General Plan;
- Provide a basis for impact analysis in the General Plan Environmental Impact Report (EIR);
- Provide a reference document for performing subsequent environmental analysis on projects within the Planning Area;
- Provide a single source for convenient and efficient retrieval of information about the City.

A Master Environmental Assessment is not "defined" by the California Environmental Quality Act (CEQA) and the CEQA Guidelines do not specify a format. Section 15169 of the Guidelines suggests that an MEA may contain:

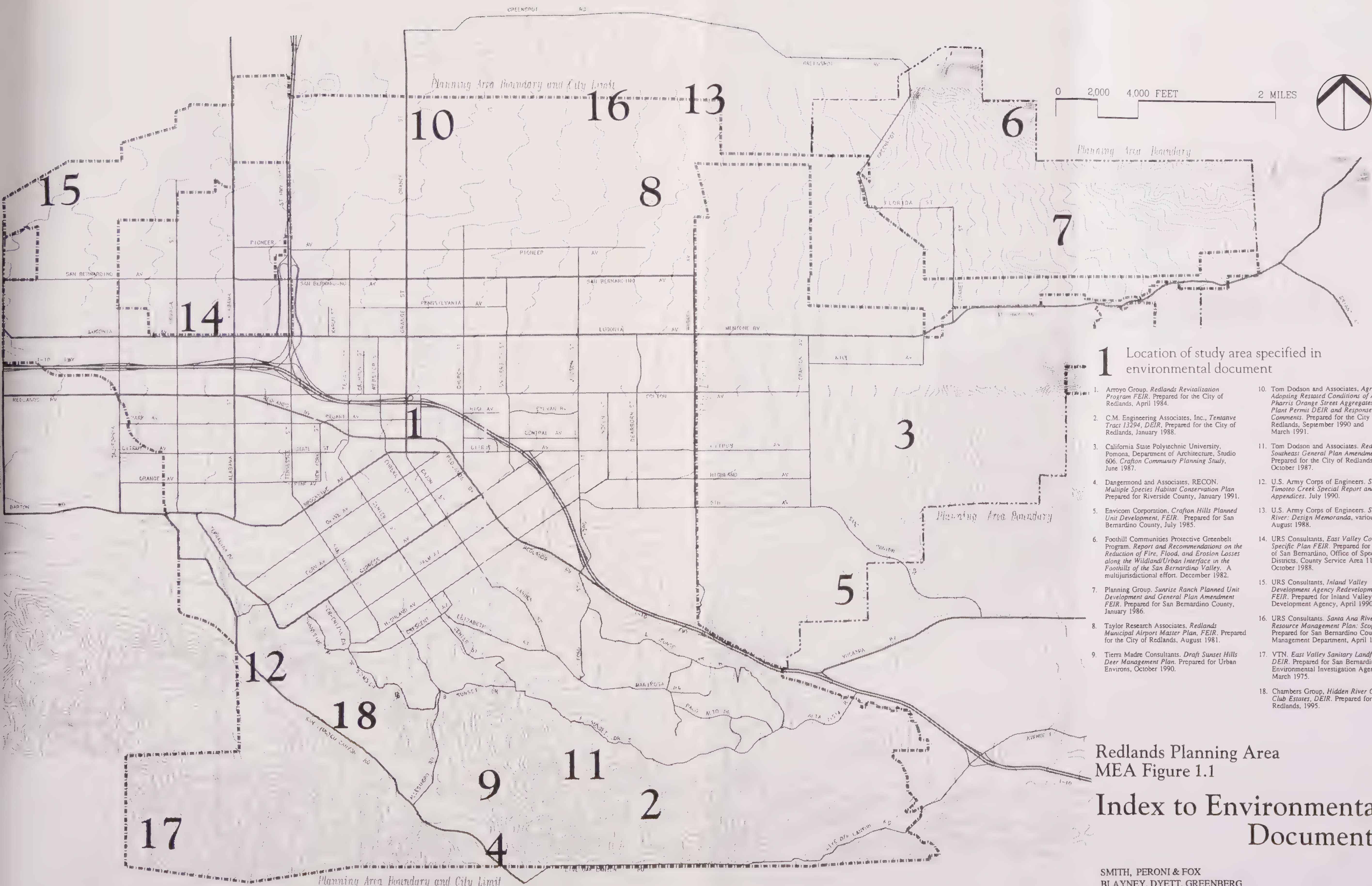
> . . . an inventory of the physical and biological characteristics of the area for which it is prepared, and may contain such additional data and information as the public agency determines is useful or necessary to describe environmental characteristics of the area. It may include identification of existing levels of quality and supply of air and water, capacities and levels of use of existing services and facilities, and generalized incremental effects of different categories of development projects by type, scale, and location.

MEA Figure 1.1, Index to Environmental Documents, graphically depicts some of the key locations within the Planning Area for which environmental documents exist. Information from many of these documents has been used in the preparation of this MEA. For further area-specific details, the reader should consult the original documents as listed in MEA Figure 1.1.

**Structure and organization.** Although the order of the sections differs, the topical units in the MEA parallel the topics in the General Plan. Each topical section begins with a general "summary extract," providing an overview. This summary extract is reprinted in the EIR, prior to analysis of impacts, for the reader's convenience. At the close of each topical section in the MEA is a list of sources and further references the reader may consult. In MEA Section 15.0, Community Services, which addresses several distinct community services, sources and references are listed after each sub-section.

**Relationship to the General Plan.** The introductory text sections of the General Plan are based on the data compiled on the Planning Area for the MEA, distilled into a page or two of background information for Plan policies -- policies which are based on the data gathered in preparation of the MEA. General Plan readers should consult the MEA for a detailed understanding of policy origins. MEA Figure 1.2, Regional Location, shows the regional setting of the General Plan, MEA Figure 1.3, Planning Boundaries, outlines planning boundaries, and MEA Figure 1.4, Planning Sectors and Traffic Analysis Zones, divides the Planning Area into planning sectors.

**Relationship to the General Plan EIR.** The MEA provides the "environmental setting" for the Redlands General Plan EIR. The MEA also specifies factors or generation rates which are used in the "impact" sections of the EIR to assess the environmental impacts of the Plan. As noted above, the summary extract which heads each MEA section is reprinted at the beginning of each EIR section.



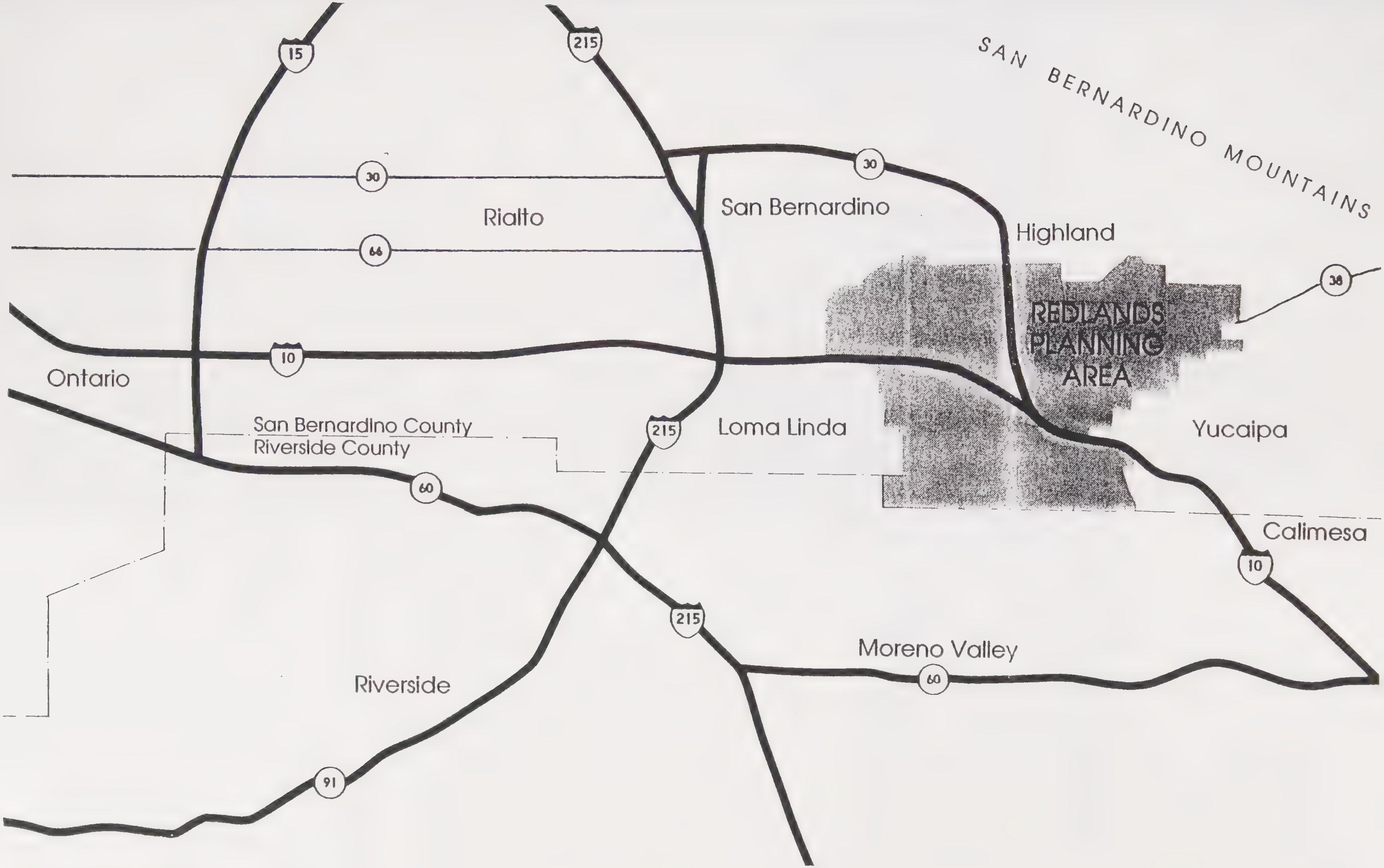

1 Location of study area specified in environmental document

1. Arroyo Group. *Redlands Revitalization Program FEIR*. Prepared for the City of Redlands, April 1984.
2. C.M. Engineering Associates, Inc., *Tentanve Tract 13294, DEIR*. Prepared for the City of Redlands, January 1988.
3. California State Polytechnic University, Pomona, Department of Architecture, Studio 606. *Crafton Community Planning Study*, June 1987.
4. Dangermond and Associates, RECON. *Multiple Species Habitat Conservation Plan* Prepared for Riverside County, January 1991.
5. Envicom Corporation, *Crafton Hills Planned Unit Development, FEIR*. Prepared for San Bernardino County, July 1985.
6. Foothill Communities Protective Greenbelt Program. *Report and Recommendations on the Reduction of Fire, Flood, and Erosion Losses along the Wildland/Urban Interface in the Foothills of the San Bernardino Valley*. A multijurisdictional effort. December 1982.
7. Planning Group. *Sunrise Ranch Planned Unit Development and General Plan Amendment FEIR*. Prepared for San Bernardino County, January 1986.
8. Taylor Research Associates, *Redlands Municipal Airport Master Plan, FEIR*. Prepared for the City of Redlands, August 1981.
9. Tierra Madre Consultants. *Draft Sunset Hills Deer Management Plan*. Prepared for Urban Environs, October 1990.
10. Tom Dodson and Associates, *Agreement Adopting Restated Conditions of Approval for Pharris Orange Street Aggregates Processing Plant Permit DEIR and Response to Comments*. Prepared for the City of Redlands, September 1990 and March 1991.
11. Tom Dodson and Associates. *Redlands Southeast General Plan Amendment, FEIR*. Prepared for the City of Redlands, October 1987.
12. U.S. Army Corps of Engineers. *San Timoteo Creek Special Report and Technical Appendices*. July 1990.
13. U.S. Army Corps of Engineers. *Santa Ana River: Design Memoranda*, various volumes. August 1988.
14. URS Consultants, *East Valley Corridor Specific Plan FEIR*. Prepared for the County of San Bernardino, Office of Special Districts, County Service Area 110. October 1988.
15. URS Consultants, *Inland Valley Development Agency Redevelopment Plan FEIR*. Prepared for Inland Valley Development Agency, April 1990.
16. URS Consultants. *Santa Ana River Resource Management Plan: Scoping Project*. Prepared for San Bernardino County, Land Management Department, April 1988.
17. VTN. *East Valley Sanitary Landfill Site DEIR*. Prepared for San Bernardino County Environmental Investigation Agency, March 1975.
18. Chambers Group, *Hidden River Country Club Estates, DEIR*. Prepared for the City of Redlands, 1995.

Redlands Planning Area
MEA Figure 1.1

# Index to Environmental Documents

SMITH, PERONI & FOX
BLAYNEY, DYETT, GREENBERG
ESRI



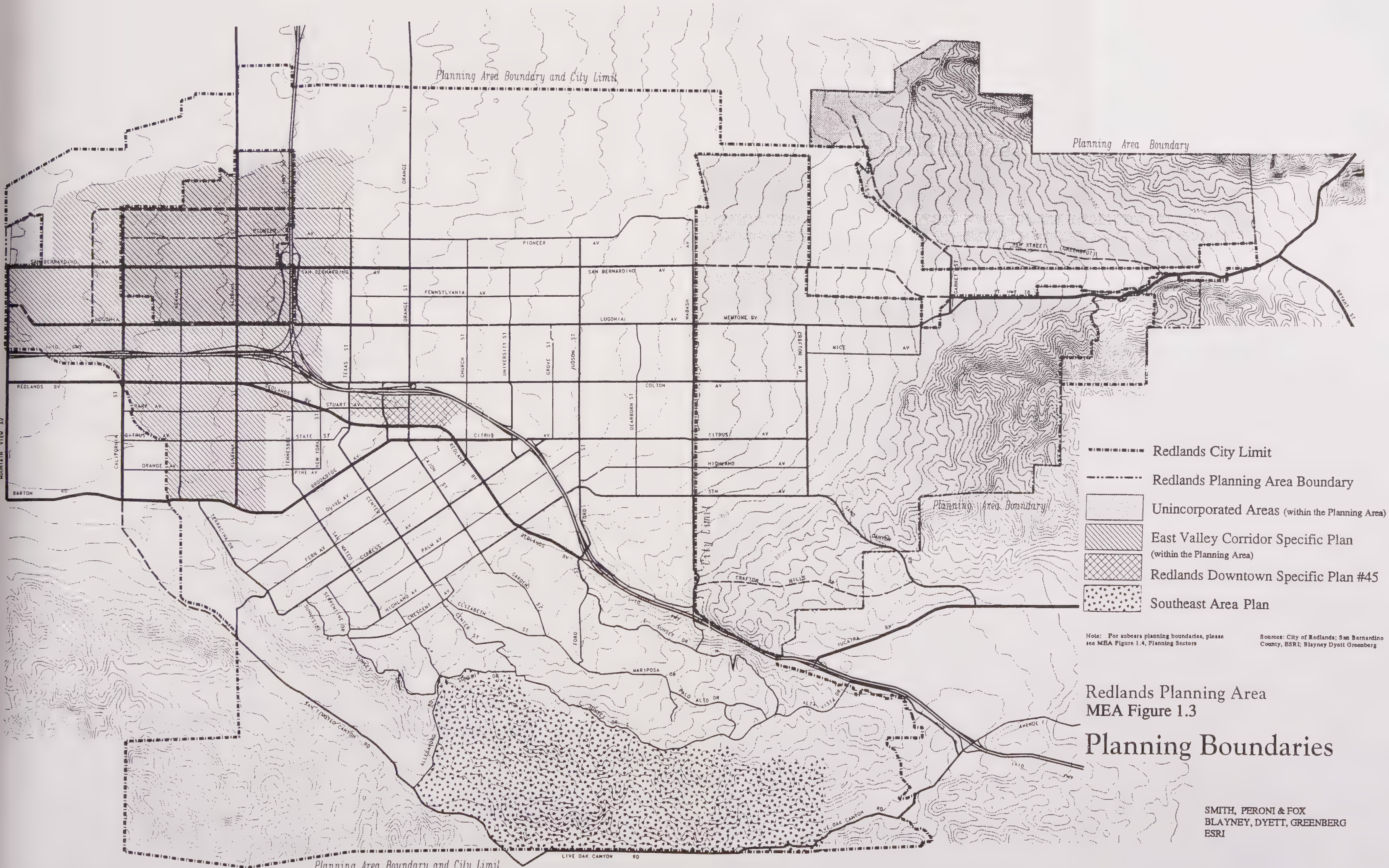

Redlands Planning Area
MEA Figure 1.2

Not to Scale

Sources: Smith, Peroni & Fox

# Regional Location

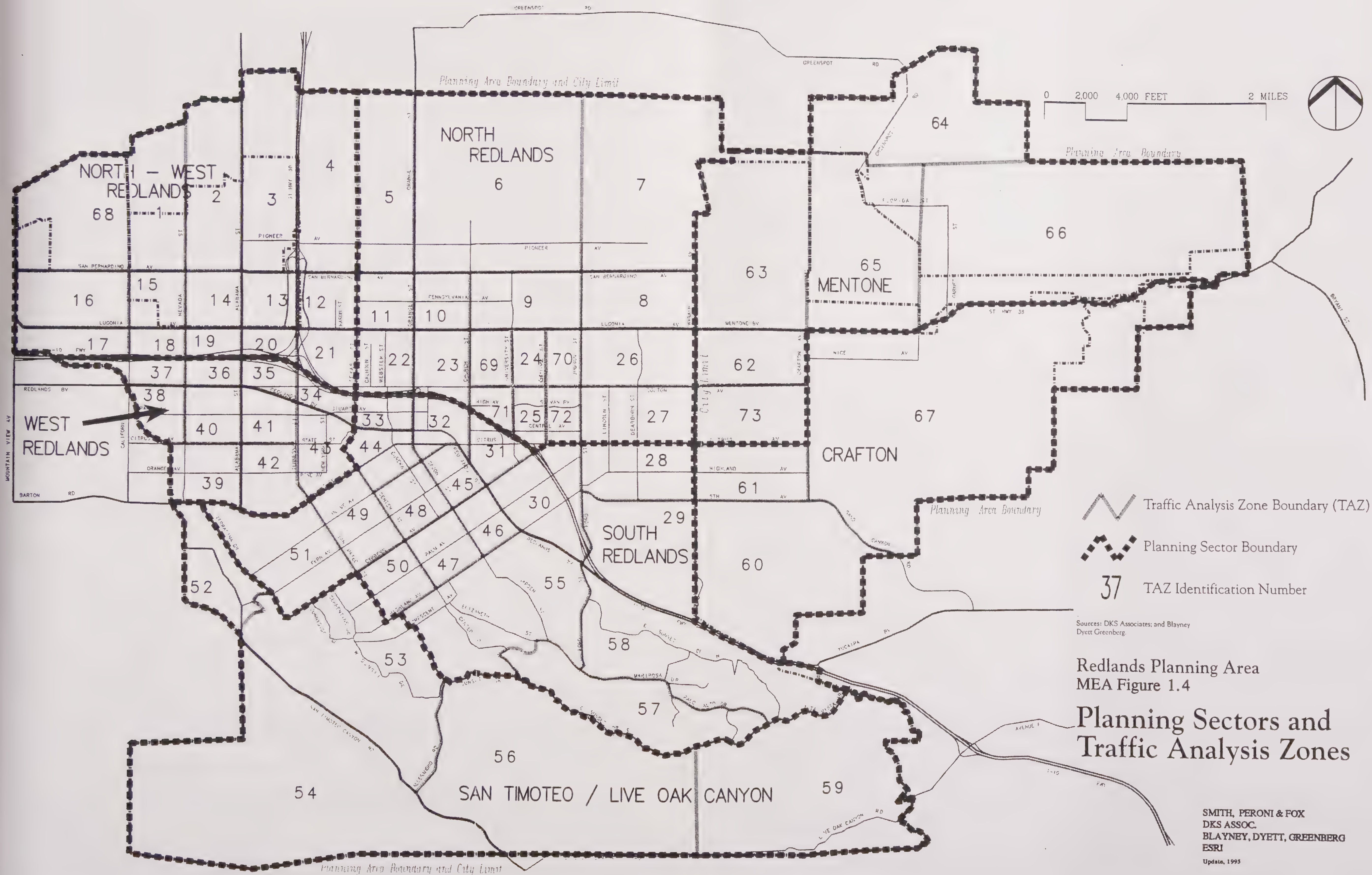
SMITH, PERONI & FOX




Redlands Planning Area
**MEA Figure 1.3**

# Planning Boundaries

SMITH, PERONI & FOX
BLAYNEY, DYETT, GREENBERG
ESRI




Redlands Planning Area
MEA Figure 1.4

# Planning Sectors and Traffic Analysis Zones

**Subsequent environmental review.** The General Plan EIR is necessarily less detailed than an EIR prepared for a specific development project. Additional, subsequent environmental analysis may be required for development proposals that implement Plan policies. The MEA should provide sufficient environmental setting information to determine the areas of potential impact and the need for additional environmental analysis. If regularly updated, this information could be used in the preparation of initial studies and notices of preparation as required by CEQA. The MEA can also serve as a reference which may be cited in future project-level environmental documents to help reduce their bulk and cost.

**Need for periodic updating.** In order to be useful for the purposes described, the MEA should be reviewed periodically and revised as needed so that it is current and accurate. The addition of updated information will also establish a basis for measuring change in the City, and serve as a reminder of the need to periodically update the General Plan.

Policies in the Draft General Plan propose a number of studies or topical plans which must be completed for full Plan implementation. As these studies or plans are completed, the MEA should be updated as necessary to reflect new information. These milestones include the completion of:

- Designation of Historic and Scenic Districts whenever areas are qualified and supported by a significant majority of the property owners. (Policy 3.21a)
- Preparation of a Comprehensive Airport Land Use Plan (CALUP) for Redlands Municipal Airport. (Policy 5.70g)
- Preparation of a Trails Plan. (Policy 7.11b)
- Preparation of a Master Biotic Management Plan. (Policy 7.21g)
- Updating the City of Redlands' Water Master Plan. (Policy 7.22e)
- Identification of significant nonrenewable paleontologic resources. (Policy 7.30f)
- Identification of mineral resource and reserve areas and areawide aggregate transportation routes. (Policy 7.42d)
- Implementation of the San Bernardino County Congestion Management Program (CMP). (Policy 8.11g)
- Implementation of a Travel Demand Management (TDM) Program. (Policy 8.12k)
- Drafting fire protection standards suitable for Rural Living areas not exposed to high wildland fire hazards. (Policy 8.30e)
- Preparation of a Master Drainage Plan. (Policy 8.40h)
- Possible amendment to the Zoning Ordinance to include restrictions for soil types with development constraints similar to the Saugus Sandy Loam series. (Policy 8.50j)
- Identification of areas susceptible to high winds. (Policy 8.60b)
- Continued update and revision of the City's Emergency Plan. (Policy 8.90c)

In addition, as EIRs are completed on proposed development projects, any new information provided by site-specific study should be incorporated and/or referenced in the appropriate MEA section(s).

Availability of new information based on agency or university studies could also trigger a partial MEA update. New information of relevance would include, for example, a change in status of the Banning fault, additional data on reservoir drawdown and refilling and induced seismicity, and conclusive study linking exposure to certain doses of electromagnetic radiation with disease.

**Figure numbering.** Many figures published in the Draft General Plan are replicated in the MEA for ease of reference. These GP figures along with those published solely in the MEA are designated by "MEA Figure" and are numbered consecutively throughout the MEA document.

**Use of ESRI's geographic database.** Environmental Systems Research Institute, Inc. (ESRI) provided technical support to Blayney Dyett Greenberg, Urban and Regional Planners, and Smith, Peroni & Fox, Planning Consultants, Inc., throughout revision of the General Plan. Using ARCINFO, ESRI developed an automated geographic database to quantify existing and future conditions, that served as the quantitative basis of the Plan, as well as the MEA/EIR analysis. Acreages cited in this document were derived from ESRI data.

ESRI used an automated parcel base map provided by San Bernardino County as the base for coding various parcel-related layers, such as general plan, zoning, or existing land uses. For environmental data, ESRI employed the NASA Vertical Integration Database containing environmental hazards, a database showing agricultural preserves, and the California Department of Conservation Farmland Database. Data on flood zones, noise, and topographic contours were automated and added to the environmental data layers. Using the database, ESRI facilitated the development and analysis of different land use scenarios and alternatives. Most of the base maps and many of the reference maps contained in the MEA were produced by ESRI.

# 2.0 LAND USE

Redlands General Plan / MEA

## 2.0 LAND USE

### Summary Extract

The Land Use section of this Master Environmental Assessment describes existing land use conditions within the Redlands Planning Area as of the 1994 base year and serves as a background report for the accompanying Environmental Impact Report (found later under this cover). This section covers both existing (built) land uses as well as the existing General Plans (City of Redlands and the County of San Bernardino) currently in effect throughout the Planning area. Together these serve as a reference point for understanding the changes inherent in the General Plan update. A discussion of the General Plan Update, including the policy emphasis of the document and proposed land use designations, along with their relation to existing land uses is found in the accompanying EIR.

### Project Location

The City of Redlands is located at the eastern end of the San Bernardino Valley along the Interstate 10 Freeway approximately 70 miles east of Los Angeles. Features including the Santa Ana Wash to the north, the Crafton Hills to the east, the San Timoteo Canyon to the south, and the City of Loma Linda to the west define and delimit the existing community of Redlands.

### The Planning Area

California Law directs a city to include within its planning area "any land outside its boundaries which, in the planning agency's judgment bears relation to its planning." The Redlands Planning Area, as defined by the City Council, includes the incorporated City limits, the City's current Sphere of Influence as determined by the San Bernardino County Local Agency Formation Commission (LAFCO) and the area of unincorporated County land generally located between Mill Creek and the Santa Ana River to the San Bernardino National Forest Boundary in the Northeastern corner of the Planning Area and which the City has determined to be in their planning area of interest. This area may be added to the City's sphere in the future. The Planning area totals approximately 33,083 gross acres (or about 52 square miles) or approximately 29,650 net acres excluding existing streets.

MEA Figure 1.3, Planning Boundaries, identifies the Planning Area and its major components including the incorporated City limits and the existing sphere of influence.

### General Plans of Adjoining Jurisdictions

The plans of agencies that set development policy adjoining the Redlands Planning Area or within it have obvious effects on the Redlands General Plan Land Use and are described below.

**San Bernardino County.** As revised in 1993, the County plan supports City policies within the Redlands Sphere of Influence, although entitled but unbuilt projects may be inconsistent with the Redlands General Plan. The County's General Plan states that consideration will be given to designate sphere of influence areas on the County's land use maps as Special Planning areas. Also, efforts will be made to utilize City standards for development in these areas. The County plan, which formerly would have held a population of more than 50,000 in the Mentone and Crafton sectors now includes substantial acres at rural living densities of 5 and 10 acres per housing unit. The Circulation Element, which has not been revised, designates Crafton Avenue as a major arterial extending to the Greenspot Road and Garnet Street as a minor arterial extended south along the base of the Crafton Hills.

**City of San Bernardino.** West of Mountain View Avenue the General Plan adopted in June 1989 calls for residential development at 14 units per acre adjoining I-10 Freeway, nine per acre along most of the Mountain View frontage, and heavy industry along the Santa Ana River. The area is highly developed.

**San Bernardino International Airport.** The property is currently being marketed for airport and industrial re-use by the Inland Valley Development Agency which collects property tax increment from an area that includes the unincorporated 'donut hole' in the East Valley Corridor portion of the Redlands Planning Area.

**City of Highland.** The Santa Ana River Wash separates Redlands and Highland, which incorporated in 1987. Significant pressure to develop mineral extraction operations in the wash, as well as potential development to build into the flood plain, may be a source of conflict with the City of Redlands. Both cities should work closely with each other and the County Flood Control and Water Conservation District to preserve natural resources and ensure public safety. The Circulation Element of its first General Plan proposes eastward extension of Base Line Street which would turn south across the Santa Ana Wash to connect to Crafton Avenue as proposed by the San Bernardino County Circulation Element.

**City of Yucaipa.** The City of Yucaipa adopted a General Plan in September of 1992. Of particular interest to the City of Redlands is the Planned Development (PD) land use designation for the area south of the I 10 freeway and east of the Live Oak Canyon Road, which Yucaipa has zoned for a master planned development which may mix residential and commercial uses. Adjacent to the City of Redlands, in the Crafton Hills area, Yucaipa has approved a 59 lot PD fronting Bryant Street and Mill Creek Road and has dedicated open space to conform with the Crafton Hills Conservancy proposal. The City also adopted a Hillside Slope Ordinance in July of 1991 which restricts development on properties with an average hillside slope of 10% or greater. Crafton Hills Drive, a limited access collector, is a proposed link between Redlands and Yucaipa. Within Yucaipa, recorded Tract 12222 proposes a connection of Crafton Hills Drive with Sand Canyon Road. The City of Redlands is currently studying Wabash to locate the western terminus of Crafton Hills Drive.

**City of Loma Linda.** Redlands' westside neighbor proposes a mixed use, Hotel/Retail development north of Barton Road and residential development to the south with single-family detached subdivision densities declining as the slope increases. A firm boundary between the Redlands and Loma Linda spheres of influence was established in 1990. Loma Linda's General Plan is presently under revision and the use of about 600 acres adjoining Redlands has not been designated at this time. Currently, a residential designation has been used for development proposals for this area at 2.7 units per acre. However, Loma Linda is investigating a residential specific plan which may consider up to 5-6 units per acre. This may have potential conflict with the Redlands Land Use Plan. Another possible dispute could arise over the alignment of San Timoteo Canyon Road. SANBAG has proposed five alternatives for connection from the East Valley Corridor to Moreno Valley area. Both jurisdictions will need to work with the regional agency to resolve alignment issues regarding this roadway.

**Riverside County.** The Riverside County line is an arbitrary boundary to the Planning Area, running a few feet either side of Live Oak Canyon Road for several miles east of San Timoteo Canyon Road. Oak Valley, a 10-square-mile "new town" approved in 1988 by Riverside County extending along the County line and Beaumont, would have about 45,000 residents and 34,000 jobs if built-out. This project has been experiencing financial difficulties due to the current economic slowdown. A golf course, but no residential units, has been built as of 1995. Riverside County's Multiple Species Habitat Conservation Plan is an unadopted draft plan still under revision and downsizing. This plan could affect areas to the west of Oak Valley adjoining the Redlands Planning Area with possible preservation of the Badlands.

**City of Moreno Valley**. The City of Moreno Valley is located in the County of Riverside and may extend its sphere of influence and/or city limits to adjoin the City of Redlands sometime in the future. The proposed designation may be hillside residential or rural residential which can have densities ranging from one-half acre to ten acres.

**City of Calimesa.** The City of Calimesa is located in the County of Riverside and has city limits and sphere of influence areas that adjoin the City of Redlands to the south of Live Oak Canyon Road. Calimesa's General Plan, adopted in 1994, designates this area as a natural resource to the community and region. Development within the natural resource categories is limited to protect and to retain the natural environment. The areas adjoining the Redlands Planning Area are designated Open Space Residential (OSR) and Open Space (OS). These designations are generally consistent with land uses proposed for Live Oak Canyon.

**Southern California Association of Governments (SCAG).** The Regional Comprehensive Plan and Guide (1989) serves as the basis for housing allocations that must be incorporated in the Redlands Housing Element. The Regional Mobility Element, incorporated into the Regional Comprehensive Plan, affects funding for major transportation projects which are important to Redlands. SCAG calls for a 3.4 percent average annual increase in housing in the East San Bernardino Valley between 1990 and 2010, but projects a 4.1 percent average annual increase in employment. SCAG requires local agencies to meet the requirements of several regional plans aimed at reducing impacts on various issues, including but not limited to, growth (Jobs/Housing/Population), transportation, air quality, energy, water resources, and waste management. These are briefly described below.

**1989 Growth Management Plan**. The purpose of the Growth Management Plan (GMP) is to encourage local land use actions which could ultimately lead to development of an urban form that will help minimize development costs, save natural resources, and enhance quality of life in the region. Goals of the GMP aim at enabling individuals to spend less income on housing, enable firms to be more competitive, minimize public and private development costs, preserve open space and natural resources, attain mobility and clean air quality, avoid economic and social polarization, and accommodate a diversity of life styles. The GMP is concerned with achieving a balance between the availability of jobs and the provision of housing on a sub-regional basis. The GMP classifies the San Bernardino Valley area as a jobs poor/housing rich region. Consistency with this plan is discussed in the Housing Element.

**Regional Mobility Element (RME)**. This element is the principal transportation policy, strategy and objective statement of SCAG. It proposes a comprehensive strategy for achieving mobility and air quality mandates. The RME lists the planned improvement to transportation facilities that the County Transportation Commission, the state, and other agencies have committed to fund over the next twenty years to provide better mobility of people and goods. In terms of impacts resulting from the Redlands General Plan update, the relevant portions of the RME state that:

- adequate capacity must exist in the subregion transportation network to absorb said development,
- that funds must be generated to pay for required improvements, and
- that all measures must be taken to reduce person trips, vehicle trips and peak hour traffic.

Consistency with the RME is discussed in MEA Section 12.0, Traffic.

**Regional Housing Needs Assessment (RHNA)**. The Department of Housing and Urban Community Development (HCD) is required to provide SCAG with their determinations of existing and projected housing needs by economic group. These determinations identify the SCAG region's share of the statewide need for housing and are intended for use in developing a new regional housing needs plan. Currently, the State has suspended the mandate to prepare regional housing needs plans and contends that SCAG may wish to prepare a 1995 regional housing needs plan. In response to this suspension, SCAG has used the same projections in 1989 and extended the time-frame of five years to the year 1996. Consistency with current RHNA numbers is discussed in the Housing Element. When HCD terminates the suspension, SCAG will review their regional housing stock and update their needs accordingly.

**1989 Hazardous Waste Plan**. The need for development of county and regional plans was triggered by state and federal laws that mandated the phase-out of landfill disposal of untreated hazardous wastes by the 1990's. The Hazardous Waste Plan of 1989 was prepared under the direction of the Southern California Hazardous Waste Management Authority (SCHWMA). This plan is designed to assist the region's counties and cities, the regional councils of government, and the state, in their individual efforts to plan for current and future hazardous waste management requirements. The plan facilitates the locating of facilities needed to manage hazardous waste generated by the member jurisdictions and promotes hazardous waste disposal sites in industrial areas where such waste is generated. Consistency with this plan is discussed in Section 7.0, Open Space and Conservation.

**1989 Air Quality Plan**. Air quality impacts in Southern California have been a concern due to the continued degradation of clean air. This plan identifies transportation, land use and energy conservation measures aimed at reducing air pollution and conserving the environment. A determination of the project's consistency with AQMP is based on whether the proposed project meets conformity criteria including whether the:

- project improves the region's jobs/housing balance,
- project demonstrates that vehicle trips and vehicle miles generated have been reduced to the greatest extent feasible, and
- EIR demonstrates that the project will not have a long-term negative impact on regional air quality.

The proposed project, as mitigated, is deemed consistent with the AQMP in that it is not defined by the AQMP as a significant project.

**1989 California Integrated Waste Management Act (AB 939)**. Assembly Bill 939 (California Integrated Waste Management Act) was passed by the California Legislature in 1989 to address the solid waste issue. This act requires local governments to prepare comprehensive plans to reduce the amount of solid waste generated in their jurisdictions and disposed of in all landfill or other means by 25 and 50 percent by the years 1995 and 2000, respectively. This act addresses issues associated with meeting solid waste management goals in Southern California. Consistency with this plan is discussed in Section 7.0, Open Space and Conservation.

**Land Use Influences**

Within the planning area, a number of important factors have influenced development of existing land use patterns. To a large degree, topographic features serve to delimit the existing and potential growth of Redlands. These include the Crafton Hills, a cluster of gently sloping hills which occur at the eastern edge of the planning area between Redlands and Yucaipa; the Santa Ana Wash, a broad floodway extending from the San Bernardino Mountains to the coast which defines the City's northern boundary; and the San Timoteo and Live Oak Canyon areas, an incised, largely undeveloped canyon system which demarcates the southerly extent of development within the City. Steep topography and a lack of infrastructure facilities such as sewer have limited the amount of urban development in these canyons.

Major transportation facilities also play a role in the existing land use pattern. Primary among these are the Interstate 10 Freeway which traverses the planning area from east to west and the newly constructed State Highway 30 which proceeds north from the I-10 across the Santa Ana Wash and into the City of Highland. The location of roadway networks also acts as a major influence on the development pattern within a given area by opening up lands to urbanization. Other locally significant roadways within the planning area include Alabama Street and Orange Street, which cross the Santa Ana Wash, Redlands Boulevard and Barton Road which link Redlands with Loma Linda, Highway 38 (also called Lugonia Avenue and Mentone Boulevard) which accesses the mountain community of Big Bear to the northeast, and San Timoteo Canyon Road, a two lane rural roadway which connects Barton Road in Redlands to the hills and canyons in the southern part of the planning area.

As an older community with roots dating back to the late 1800s, historic land use activities have had a much greater influence on the present City pattern than in many newer communities. In particular, the compact

appearance of the historic downtown; the deep, narrow agricultural parcel divisions in the northeastern and northcentral portions of the planning area associated with citrus production and the stately Victorian neighborhoods in south Redlands typify this influence.

The jurisdictional boundaries of neighboring cities including Loma Linda, San Bernardino, Highland, Yucaipa, and Moreno Valley largely define the planning area itself.

**Existing Land Uses**

MEA Figure 2.1, Existing Land Uses, provides a graphic representation of existing uses within the project area. The definition of each grouped land use category is as follows: RESIDENTIAL includes single family detached and attached units, condominiums, apartments, and mobile homes; COMMERCIAL- INDUSTRIAL-OFFICE includes the downtown business district, strip commercial uses, offices, manufacturing and industrial uses; OPEN SPACE includes citrus, other agriculture, watercourses and drainages, improved parks and unimproved park land; PUBLIC-INSTITUTIONAL includes airport, governmental, civic, educational, hospital, landfill, and similar uses; VACANT includes land where some type of urban development is permitted by current policy but where no development has occurred.

Table 2.1 below, Existing Land Use, identifies the existing acreages within major land use groupings contained in the project area. The acreage figures described below are based upon computerized calculations done by ESRI for the Planning Area and are expressed in summary groupings to allow comparison between existing and proposed land uses. Acreage of existing streets is not included in these calculations.

**Table 2.1**
**Existing Land Uses**

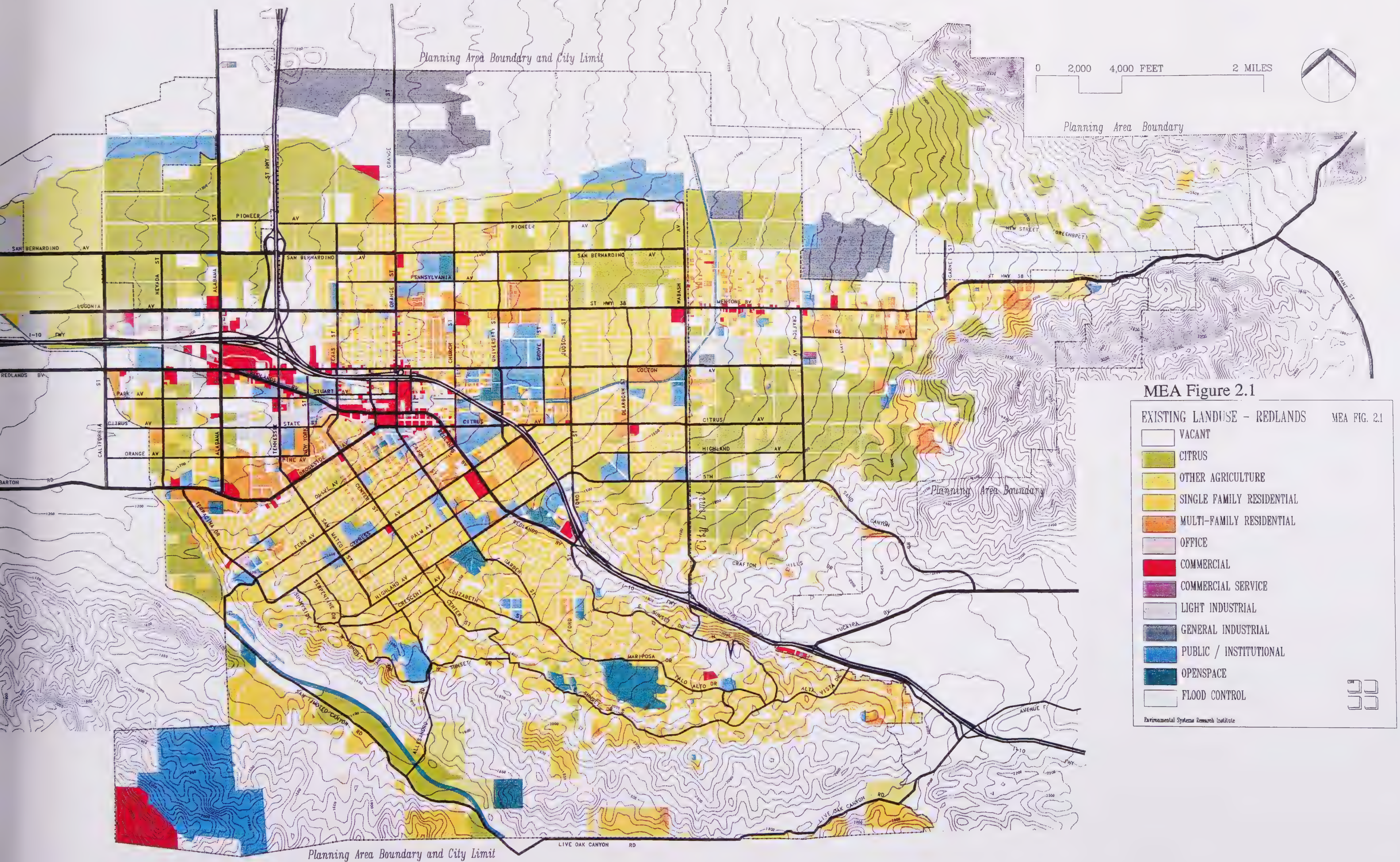
| Grouped Land Uses | # of Acres | % of Total |
|---|---|---|
| RESIDENTIAL | 7,177 | 24% |
| COMM-INDUS-OFFICE | 1,709 | 6% |
| PUBLIC INSTITUTIONAL | 1,542 | 5% |
| OPEN SPACE* | 7,155 | 24% |
| VACANT | 12,069 | 41% |
| **TOTAL**** | **29,650** | **100%** |

* includes citrus, agriculture, flood control and other open space lands
** does not include existing street right-of-way

Vacant land and open space account for 41% and 24% of the project area respectively. Developed residential, commercial-industrial, and public institutional uses make up the remaining 35%.

Existing developed residential uses account for 24% of the total acreage in the planning area and includes all categories of homes, condominiums, and apartments. Single family detached residential units occupy the largest amount of residential acreage with 87% of the total project area. Multiple family properties, including condominiums and apartments make up the remaining 13%.

Commercial, Industrial, and Office development within the Planning Area together account for 6% of the total project area. Office development occurs throughout the City but is particularly concentrated in areas such as the Downtown and Orange Tree Lane areas as well as in the vicinity of Redlands Community


Planning Area Boundary and City Limit
0 2,000 4,000 FEET 2 MILES
Planning Area Boundary
MEA Figure 2.1
EXISTING LANDUSE - REDLANDS
MEA FIG. 2.1
VACANT
CITRUS
OTHER AGRICULTURE
SINGLE FAMILY RESIDENTIAL
MULTI-FAMILY RESIDENTIAL
OFFICE
COMMERCIAL
COMMERCIAL SERVICE
LIGHT INDUSTRIAL
GENERAL INDUSTRIAL
PUBLIC / INSTITUTIONAL
OPENSPACE
FLOOD CONTROL
Environmental Systems Research Institute
City Limit
Planning Area Boundary
Planning Area Boundary and City Limit

Hospital. Currently, there are several sites within the project area which may be termed heavy industrial uses. All of these occur in or along the Santa Ana Wash including aggregate mining activities adjacent to Orange Street. Light industrial uses are situated primarily in the East Valley Corridor, Downtown, and Mentone areas while commercial uses are located in the historic Downtown, Tri Cities complex, along Redlands Boulevard, and in Mentone. Neighborhood shopping centers are distributed to serve most of the developed City.

Open Space makes up 24% of the total project area. Open Space uses include watercourses, golf courses, citrus groves, other forms of agricultural production land, improved parks, unimproved open space lands and other uses which are essentially open in character. Citrus and other agriculture makes up the largest single open space feature in Redlands accounting for approximately 80% of undeveloped open areas within the project area.

Public-Institutional uses account for 5% of the total project area and include the civic center, airport, schools, hospital and other public and quasi-public facilities.

Vacant land, which is not a land use in itself, makes up the largest single existing category, accounting for 41% of the project area. The Vacant category is used to indicate undeveloped land which is either already subdivided but undeveloped, or which is subject to development under current policy.

**Incorporated Versus Unincorporated Area**

MEA Table 2.2, Existing Land Uses - Incorporated, Sphere, and County Territory, provides a comparison of incorporated and unincorporated existing land use totals for the project area. As shown in the table, the planning area is largely incorporated with approximately two thirds lying within the Redlands City Limits. One third of the planning area is within unincorporated San Bernardino County territory.

**Table 2.2**
**Existing Land Uses**
**Incorporated, Sphere, and County Territory**

| | INCORPORATED | |
|---|---|---|
| Grouped Land Use | # of Acres | % of Total |
| RESIDENTIAL | 6,036 | 20.1% |
| COMM-INDUS-OFFICE | 1,498 | 5.2% |
| PUBLIC INSTITUTIONAL | 1,504 | 5.2% |
| OPEN SPACE* | 4,076 | 13.8% |
| VACANT | 7,269 | 24.5% |
| **TOTAL**** | **20,383** | **68.8%** |

| | UNINCORPORATED SPHERE OF INFLUENCE | |
|---|---|---|
| Grouped Land Use | # of Acres | % of Total |
| RESIDENTIAL | 1,100 | 3.7% |
| COMM-INDUS-OFFICE | 160 | 0.5% |
| PUBLIC INSTITUTIONAL | 39 | 0.1% |
| OPEN SPACE* | 2,331 | 7.9% |
| VACANT | 3,135 | 10.6% |
| **TOTAL**** | **6,765** | **22.8%** |

UNINCORPORATED COUNTY OUTSIDE SPHERE

| Grouped Land Use | # of Acres | % of Total |
|---|---|---|
| RESIDENTIAL | 41 | 0.1% |
| COMM-INDUS-OFFICE | 60 | 0.2% |
| PUBLIC INSTITUTIONAL | 0 | 0.0% |
| OPEN SPACE* | 736 | 2.5% |
| VACANT | 1,662 | 5.6% |
| **TOTAL**** | **2,502** | **8.4%** |

* includes citrus, agriculture, flood control and other open space lands
** does not include existing street right-of-way

Incorporated territory within the project area includes properties within the current Redlands City Limits. 20,383 acres or 68.8% of the land within the planning area is currently designated as being within the incorporated City. Within the incorporated area, Vacant land account for 7,269 acres or 24.5% of the planning area while Open Space uses contribute 4,076 acres, or 13.8% of the total planning area. The largest developed uses within the incorporated area are: Residential 6,036 acres or 20.1% of the project area, almost identical percentages of Commercial-Industrial-Office uses and Public-Institutional uses at 1,498 acres (5.2%) and 1,504 acres (5.2%) respectively.

Unincorporated Sphere of Influence within the project area is composed of the eastern portion covering the Mentone-Crafton area and the "doughnut hole" sphere area covering an infill land block within the East Valley Corridor. Together these two areas comprise a combined acreage of 6,765 acres or 22.8% of the planning area. The dominant land use in the unincorporated portion of the project area is residential, with 1,100 acres or 3.7% of the planning area. This use is followed in the Sphere of Influence areas by Commercial-Industrial-Office uses and Public Institutional uses with 160 acres or 0.5% and 39 acres or 0.1% of the planning area respectively.

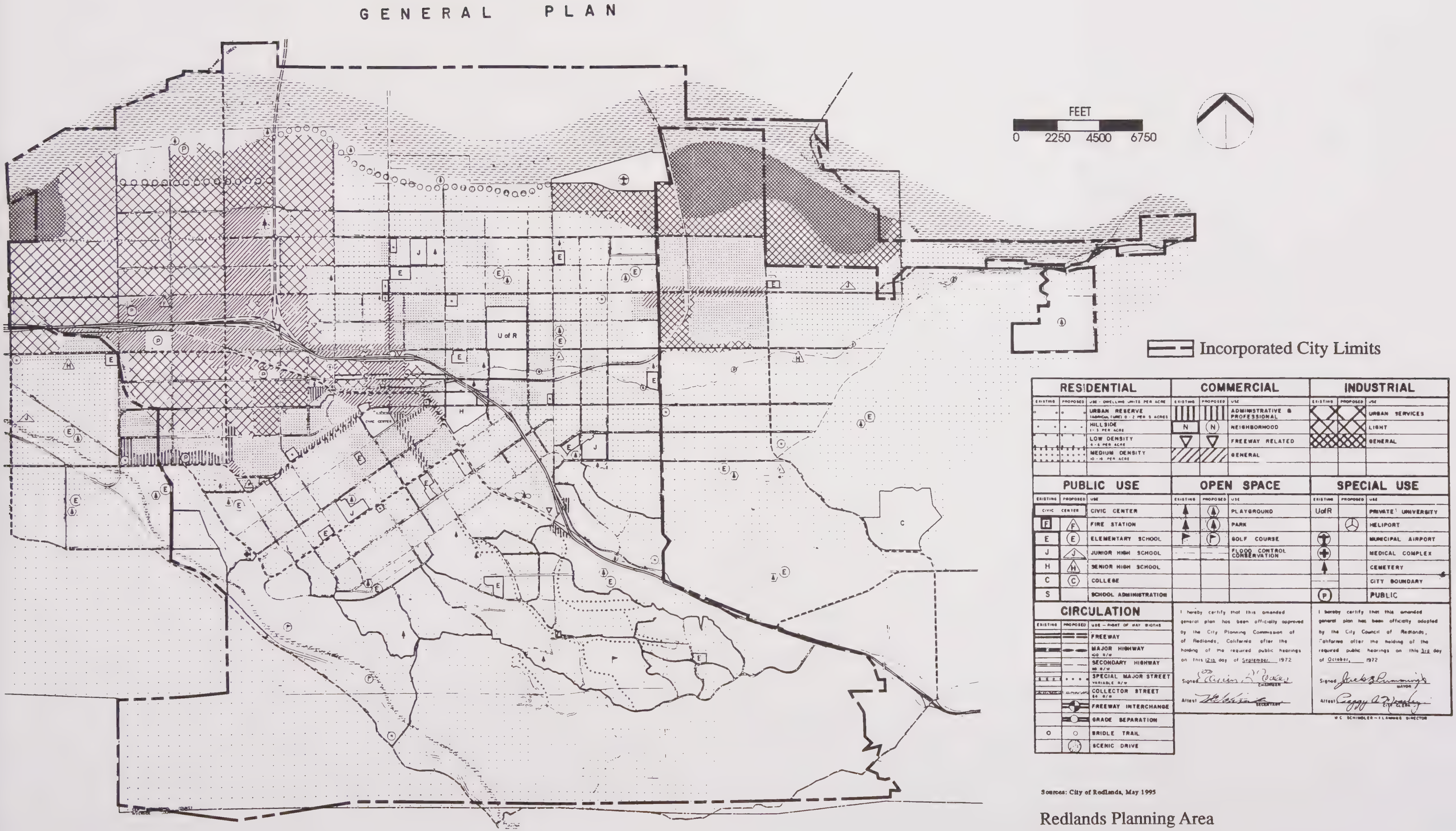
One remaining area type remains within the planning area. This consists of an area of unincorporated County land outside the City's Sphere of Influence. This area has been included as a potential future annexation area that is germane to the City's planning and is located in the Mill Creek/Santa Ana Wash area.

The area consists of approximately 2,502 acres or 8.4% of the total planning area. This area contains 1,662 acres of vacant and 736 acres of open space land which is primarily in citrus and other agriculture production. Limited residential uses (41 acres) also occur here.

**Existing General Plans**

As noted previously, the project area is currently under two jurisdictions; the incorporated portion is under the jurisdiction of the City of Redlands; the sphere of influence and the Mill Creek sphere expansion area, is under the control of San Bernardino County. The existing City and County General Plan Land Use Maps are depicted in MEA Figures 2.2 and 2.3, respectively.

As per Section 65300 of the Government Code, the City of Redlands is responsible for planning in all areas under its influence (i.e., planning area). A planning area need not be only existing incorporated and sphere of influence area, but may also include outside areas in which the City has some interest (i.e., geographic, planning, economic, demographic, environmental). Hence, the City's existing General Plan and Land Use Maps cover both the incorporated area and existing and proposed spheres of influence portions of

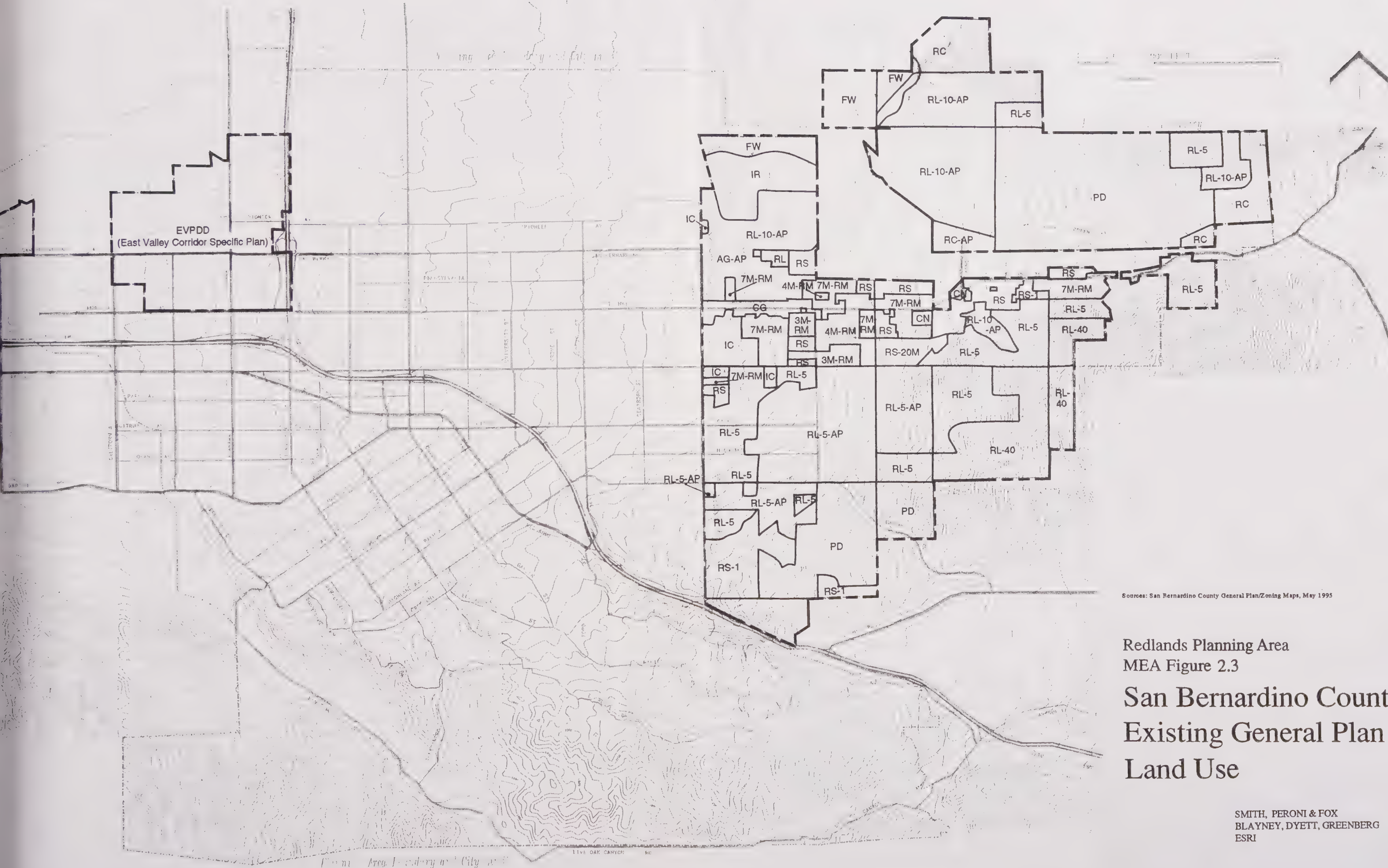



Sources: City of Redlands, May 1995

Redlands Planning Area
MEA Figure 2.2

# City of Redlands Existing General Plan Land Use

SMITH, PERONI & FOX
BLAYNEY, DYETT, GREENBERG




Sources: San Bernardino County General Plan/Zoning Maps, May 1995

Redlands Planning Area
MEA Figure 2.3

# San Bernardino County Existing General Plan Land Use

SMITH, PERONI & FOX
BLAYNEY, DYETT, GREENBERG
ESRI

the project area even though technically the City does not have jurisdiction over unincorporated territory. Both the current sphere of influence and the sphere expansion area, north of Mill Creek, are currently within the planning purview of San Bernardino County.

The City's existing General Plan was originally approved in 1972. This document projected a population holding capacity of 160,000 residents for the City of Redlands' projected 58 square mile planning area (this projection included portions of County territory). Major amendments to the 1972 General Plan included the Southeast Area General Plan Amendment in 1987 which annexed the San Timoteo-Live Oak Canyon area to the City and, in 1989, approval of the East Valley Corridor Specific Plan which added substantial amounts of commercial-industrial land uses to the Northwest quadrant of the City. MEA Figure 2.2, City of Redlands Existing General Plan Land Use, describes the City's current land use designations.

The County General Plan was adopted in July of 1989 and revised in August of 1991. Existing County land uses are described in MEA Figure 2.3, San Bernardino County Existing General Plan Land Use. The County General Plan currently governs over unincorporated areas within the Redlands Planning Area boundary including a portion of the East Valley Corridor along with major portions of the Crafton - Mentone Planning Sectors. In the East Valley Corridor, the County land use incorporates the EVC Planned Development District which uses the commercial-industrial categories identified in the East Valley Corridor Specific Plan while in the Crafton-Mentone area, County land uses consist of strip commercial designations along Mentone Boulevard (Highway 38), low density residential uses consisting of RL-5 (5 acre minimum lot) in citrus and agricultural areas and RL-40 (40 acre minimum lot) along the slopes of the Crafton Hills. Some areas of PD (Planned Development) are also designated in this area coinciding with large potential master planned projects such as the "Sterling on the Green" project off Sand Canyon Road and the previously proposed "Sunrise Ranch" development situated in the Mill Creek- Santa Ana Wash area.

MEA Table 2.3 below, Land Use Under Existing General Plans, identifies uses at buildout under the existing City General Plan for incorporated areas and the San Bernardino County General Plan for the City's current sphere of influence and the Mill Creek sphere expansion area.

To achieve an unbiased comparison between existing and proposed general plans, areas designated Resource Conservation (RC, i.e., lands generally over 30% slope) were treated identically under analysis of both plan scenarios. This was done since the City's slope density ordinance currently in place would be used to implement development projects under the existing General Plan. Consequently, RC acreage was removed from the existing "Hillside Residential" category and included under "Open Space" on MEA Table 2.3, below. Also, existing "Urban Reserve" acreage was included under the "Residential" category on MEA Table 2.3.

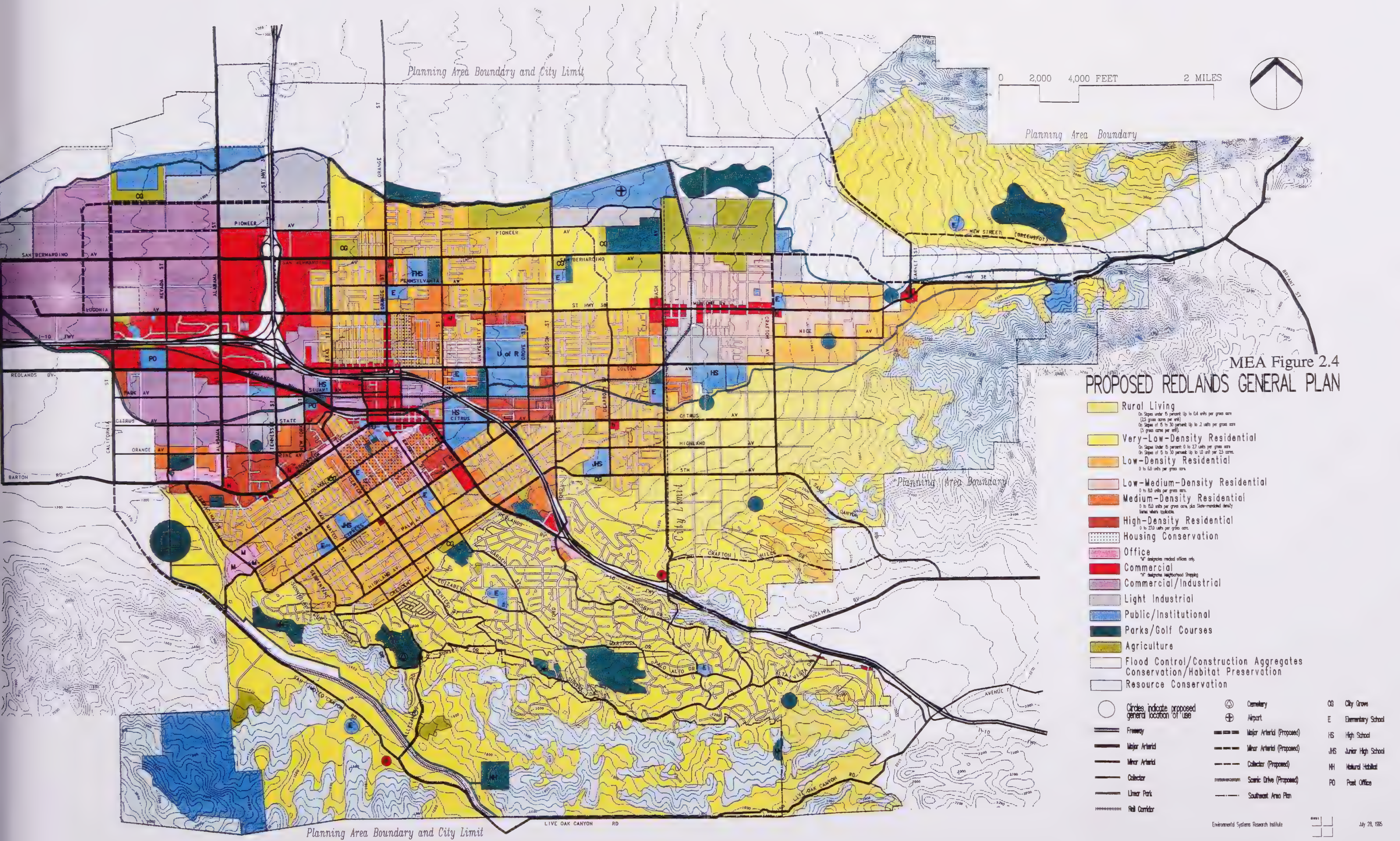
**Table 2.3**
**Land Use Under Existing General Plans**

| Grouped Land Use | # of Acres | % of Total |
|---|---|---|
| RESIDENTIAL* | 15,674 | 53% |
| COMM-INDUS-OFFICE | 5,792 | 20% |
| PUBLIC INSTITUTIONAL | 1,562 | 5% |
| OPEN SPACE** | 6,622 | 22% |
| **TOTAL*** ** | **29,650** | **100%** |

* includes "Urban Reserve" lands and excludes RC lands (over 30% slope)
** includes RL-40, citrus, agriculture, flood control and other open space lands
*** does not include existing street right-of-way

**Proposed General Plan**

For purposes of comparison with existing conditions and existing General Plans and to document the basis of the environmental analysis contained in the attached EIR, the proposed General Plan Land Use Diagram is reproduced as MEA Figure 2.4.


MEA Figure 2.4
PROPOSED REDLANDS GENERAL PLAN
Rural Living
On Slopes under 15 percent: Up to 0.4 units per gross acre (2.5 gross acres per unit)
On Slopes of 15 to 30 percent: Up to .2 units per gross acre (5 gross acres per unit).
Very-Low-Density Residential
On Slopes Under 15 percent: 0 to 2.7 units per gross acre
On Slopes of 15 to 30 percent: Up to 1.0 unit per 2.5 acres.
Low-Density Residential
0 to 6.0 units per gross acre.
Low-Medium-Density Residential
0 to 8.0 units per gross acre.
Medium-Density Residential
0 to 15.0 units per gross acre, plus State-mandated density bonus where applicable.
High-Density Residential
0 to 27.0 units per gross acre.
Housing Conservation
Office
"M" designates medical offices only.
Commercial
"N" designates Neighborhood Shopping
Commercial/Industrial
Light Industrial
Public/Institutional
Parks/Golf Courses
Agriculture
Flood Control/Construction Aggregates
Conservation/Habitat Preservation
Resource Conservation
Circles indicate proposed general location of use
Freeway
Major Arterial
Minor Arterial
Collector
Linear Park
Rail Corridor
Cemetery
Airport
Major Arterial (Proposed)
Minor Arterial (Proposed)
Collector (Proposed)
Scenic Drive (Proposed)
Southeast Area Plan
CG City Grove
E Elementary School
HS High School
JHS Junior High School
NH Natural Habitat
PO Post Office
Environmental Systems Research Institute
0 2,000 4,000 FEET 2 MILES
Planning Area Boundary and City Limit
Planning Area Boundary
PIONEER AV
SAN BERNARDINO AV
REDLANDS BV
CITRUS AV
HIGHLAND AV
COLTON
ORANGE AV
BARTON RD
CRAFTON
YUCAIPA BV
LIVE OAK CANYON RD
SAN TIMOTEO CANYON
NEW STREET (GREENSPOT)
U of R

# 3.0 OPEN SPACE

Redlands General Plan / MEA

# 3.0 OPEN SPACE

**Summary Extract.** Open space within the Planning Area falls into four General Plan categories. The Parks/Golf Courses category includes public and private facilities of park-like character. Agriculture, the next category, covers areas suitable for growing citrus, avocados, kiwis, Christmas trees, and similar crops. Flood Control/Construction Aggregates Conservation/Habitat Preservation includes areas subject to the 100-year flood, areas designated for potential mineral resource extraction, and areas to be preserved as habitat. The last category, Resource Conservation, includes those portions of the Planning Area which exceed 30 percent slope or are accessible only by traversing slopes exceeding 30 percent, some of which might also have habitat value. Total open space acreage within the Planning Area (exclusive of rail and freeway rights-of-way) is about 7,000 acres, comprising 24 percent of the acreage of the Planning Area. Vacant parcels which do not fall under the four General Plan categories listed above comprise approximately 12,000 acres which is about 41 percent of the Planning Area.

Redlands' open space includes any parcel or area of land or water which is devoted to an open space use as defined in the General Plan or designated on a local, regional, or State open space plan as one of the four types of open space defined in State planning law. Open space lands may currently be in public or private ownership. Open space uses are outlined below, although in many cases the full description or use of the open space may be found in other sections. References to those sections are provided.

## 3.1 State Planning Law Open Space Categories

**Preservation of natural resources.** This category includes, but is not limited to, areas required for the preservation of plant and animal life including habitat for fish and wildlife, areas required for ecologic and other scientific study, rivers, streams, and their banks, and watersheds.

**Managed production of resources.** This category includes, but is not limited to forest lands, rangelands, agricultural lands and areas of economic importance for the production of food and fiber; areas required to recharge of groundwater basins; marshes, rivers, streams which are important for the management of commercial fisheries; and areas containing major mineral deposits.

**Outdoor recreation.** This category includes, but is not limited to, areas of outstanding scenic, historic, and cultural value; areas particularly suited for park and recreation purposes, including access to lake shores, beaches, and rivers and streams; areas which serve as links between major recreational and open space reservations, including utility easements, banks of rivers and streams, trails, and scenic highway corridors.

**Public health and safety.** This category includes, but is not limited to, areas that require special management of regulation because of hazardous or special conditions such as earthquake fault zones, unstable soil areas, flood plains, watersheds, areas presenting high fire risks, areas required for the protection of water quality and water reservoirs, areas required for the protection and enhancement of air quality, areas designed for fuel break and fuel reduction zones, helispots, and fire access.

## 3.2 General Plan Open Space Categories

There are four types of open space designated on the General Plan. General Plan open space categories correlate with State open space categories as noted.

**Parks/Golf Courses.** This category includes both public and private facilities of park-like character, and correlates with the State category of open space for outdoor recreation. Recreational facilities are described more fully in MEA Section 15.3, Parks, including parks and trails, and are illustrated on MEA Figure 2.4, Proposed General Plan Land Use Diagram, (corresponds to GP Figure 4.1).

**Agriculture.** Areas designated are suitable for citrus, avocados, kiwi, Christmas trees, and similar crops. Agricultural operations correlate with the State category of open space for the managed production of resources, and are described in detail in MEA Section 5.0, Agricultural Lands and EIR Section 6.0, Agricultural Lands. Areas in agricultural preserves are shown on MEA Figure 5.1, Agricultural Preserves.

**Flood Control/Construction Aggregates Conservation/Habitat Preservation.** Open space for flood control includes areas subject to the 100-year flood. This designation correlates with the State category of open space for health and safety, and flooding issues are discussed in MEA Section 6.2, Flooding. MEA Figure 6.1, San Timoteo Creek Project, shows areas subject to the 100-year flood. Construction aggregates conservation includes areas designated for mineral resource extraction, considered part of the State category of open space for the managed production of resources. Habitat preservation correlates with the State category of open space for the preservation of natural resources. Mineral resource extraction is covered in MEA Section 8.0, Mineral Resources and EIR Section 9.0, Mineral Resources, and habitat preservation is discussed in MEA Section 7.0, Biotic Resources and EIR Section 8.0, Biotic Resources. Areas of valued habitat are shown on MEA Figure 7.1, Biotic Resources.

**Resource Conservation.** Resource conservation areas include those portions of the Planning Area which exceed 30 percent slope. The hazards related to steep slopes are discussed in MEA Section .1, Geology and Soils. The resource conservation designation falls within the State category of open space for public health and safety and preservation of natural resources.

## 3.3 Past Open Space Planning Efforts

**City Park and Open Space Plan, 1987/Open Space and Conservation Element, 1988.** The City's past open space plan emphasized a conceptual "emerald necklace," a series of green open space and park areas joined together with a special scenic road and trails system. Major features included buffering open spaces at the City entrances, citrus preservation, natural area preservation to the north, south and east of the City, a strip park and related trails following the Zanja from Crafton through the downtown areas to the westerly City limits, expanded park and recreation spaces, designated scenic roads, an interconnecting trails system, and rural living zones. These values have been affirmed in the development of the City's new General Plan, although the alignment and precise location of some of the open space features differ.

## 3.4 Concurrent Open Space Planning Efforts

**Redlands Open Space Committee.** The City's efforts to acquire more parkland and open space have been led by the Open Space Executive Committee of the Redlands Parks Commission which was designated to recommend acquisition in accord with the allocation of funds specified in Measure 0, the Open Space and Park Land Acquisition measure approved in 1987. Land for parks was allocated 23 percent of $7.2 million bond proceeds; land for a sports complex, golf course, and swim complex was to receive 14 percent; land for open space at major entrances to the City, 9 percent; citrus preservation, 25 percent; preservation of large natural areas, 17 percent, and a strip park with trails following the Zanja, 12 percent.

**San Bernardino County Open Space Element.** The Draft San Bernardino County Open Space Element was completed in October 1990 and revised in August 1991. An Open Space Resource Overlay was prepared in conjunction with the Element, and shows regional trail alignment, open space policy areas, wildlife corridor zones, greenbelt areas and buffer areas. The County Plan uses the State open space categories, with the addition of a category specified as open space for scenic resources. The County's *Open Space Background Appendix* contains area-specific discussions of open space lands. County-identified open space lands within or immediately adjacent to the Redlands Planning Area include the Santa Ana River, San Timoteo Canyon, Live Oak Canyon, the Crafton Hills, and the Crafton Hills citrus groves. County objectives for all of these areas include the maintenance of open space and scenic value as well as improvement of habitat and trail construction in several areas.

**Riverside County's *Multiple Species Habitat Conservation Plan* (MSHCP).** Riverside County is drafting

a *Multiple Species Habitat Conservation Plan,* affecting areas just south of the Planning Area. According to the MSHCP (1991), one area proposed for preservation is known as the Badlands/San Jacinto River Reserve, which would stretch from the Badlands south of Redlands to the San Jacinto Mountains. Within the proposed reserve, the MSHCP identifies San Timoteo Creek as providing significant riparian habitat. Live Oak Canyon's unique habitat is adjacent to the proposed reserve. Riverside County is seeking to coordinate with San Bernardino and Imperial counties in an effort to extend the boundaries of the Multiple Species Habitat Conservation Plan to include significant habitat areas within other jurisdiction in order to establish a comprehensive plan.

**Santa Ana River Trail.** The recent completion of the *Santa Ana River Corridor Trail System Master Plan* represents a major step in creating a National Recreation Trail which will link more than 32 regional feeder trails in three counties. Included in the trail plan are 75 miles of bicycle, equestrian, and hiking trails, stretching from the Pacific Ocean to Mill Creek Canyon, 35 miles of unpaved multi-use trails terminating at the Pacific Crest Trail and California Riding and Hiking Trail, and 30 miles of alternative mountain bike trails in San Bernardino National Forest. The *Trail System Master Plan* was written by consultants, with the support of the multijurisdictional Santa Ana River Coordinating Council, Tri-County Conservation League, and other groups and jurisdictions.

**Crafton Community Planning Study.** The Crafton Community Planning Study compiles data and analyzes four scenarios addressing preservation and development issues. "Scenarios 1 -- Existing Zoning", is similar to the General Plan proposal.

## 3.5 Existing Open Space Acreages

The following are existing open space categories and acreages within the Planning Area. For proposed open space categories and acreages refer to Section 4.0 in the EIR.

MEA Table 3.1
Vacant and Open Space Lands Under Existing Conditions

| | |
|---|---|
| Open Space | 437 ac |
| Flood Control | 913 ac |
| Citrus | 4887 ac |
| Other AG | 918 ac |
| Vacant | 12,067 ac |
| Total | 19,222 ac |

Source: ESRI

- **OPEN SPACE, SOURCES OF FURTHER INFORMATION:**
  - *Crafton Community Planning Study, 1987*
  - *Redlands City Park and Open Space Plan, 1987.*
  - *Redlands Open Space and Conservation Element, 1988.*
  - *Riverside County Multiple Species Habitat Conservation Plan, 1991.*
  - *San Bernardino County Open Space Background Appendix, 1991.*
  - *San Bernardino County Draft Open Space Element, 1990.*
  - Tri-County Conservation League

# 4.0 SEISMICITY, GEOLOGY AND SOILS

Redlands General Plan / MEA

## 4.0 SEISMICITY, GEOLOGY, AND SOILS

**Summary.** The geologic history of the Redlands area is important to understand and consider for planning purposes because there are several direct cause-and-effect relationships between the geologic formation of the region and the resulting seismic and geotechnical hazards. These hazards can be best evaluated by understanding how and why they formed. The geologic forces that produced the mountains and valleys that define the Redlands area also produced features that pose hazards to the people living in this area. Many of these hazards can be specifically addressed and evaluated in terms of their impact on future planning in the Redlands area. Knowing why the hazards exist should enable the City to take appropriate action to study or mitigate the geotechnical challenges that face this community.

In an overall sense, the current topography and most of the surface units within the Redlands area were formed as the result of the plate tectonic interaction between the Pacific and the North American plates, which are two major portions of the Earth's surface that are moving past each other along a zone of multiple faults within which the entire Planning Area lies. The North American plate extends from Redlands to the center of the Atlantic Ocean, while the Pacific plate extends from Redlands to Japan. Interaction of these two plates is along a series of major faults generally called the San Andreas system. This system includes the specific fault called the San Andreas, but it also includes thousands of other faults that collectively take up some of the motion between these two huge plates within the highly seismic southern California region. By understanding the relationship between the faults within the Planning Area, the complexity of the seismic risk concerns and geotechnical hazards should become readily apparent. Seismic and geotechnical hazards include ground rupture, strong ground shaking, liquefaction, earthquake induced flooding, landsliding, water-induced ground collapse, subsidence, expansive soils, and erodibility. A summary Planning Area checklist that presents the relative degree of concern for each of these geotechnical and seismic hazards compared to other areas of southern California is depicted in MEA Table 4.1, Summary Checklist of Geotechnical and Seismic Hazards. Additionally, GP Figure 8.1, Geotechnical Hazards, depicts the summary of geotechnical concerns in the Planning Area.

Several active, potentially active and non-active faults either transect or are in close proximity to the Planning Area. Active faults, as defined by the California Division of Mines and Geology (CDMG), for inclusion in Alquist-Priolo fault rupture hazard zones that traverse the Planning Area include the San Andreas and San Jacinto. Potentially active faults that transect the Planning Area include: 1) the western fault segments of the Crafton Hills fault system, known locally as the Redlands and Reservoir Canyon-Crafton Hills faults, 2) the Loma Linda fault, and 3) the Greenspot fault. The later two faults are considered segments of the San Jacinto and San Andreas faults. The above fault segments or faults are not presently zoned for Alquist-Priolo earthquake fault zone studies. However, based on current studies, they should be considered active. The western extent of the Banning fault and the Vincent thrust fault, occur in the San Timoteo Badlands and northern portion of the Crafton Hills, respectively. These faults are considered part of older fault systems and are not considered to be active or potentially active by the CDMG. The San Andreas and San Jacinto faults zones are seismically active and are capable of generating strong ground shaking throughout the Planning Area. The 30 year probability for M6.9 and M7.3 earthquakes on the San Jacinto and San Andreas faults within the Planning Area is 37 and 28 percent, respectively. Maximum horizontal ground accelerations from these 30 year probable earthquakes are anticipated to substantially exceed 0.4g, which is the current maximum Uniform Building Code design value.

**Table 4.1**
**Summary Checklist of Geotechnical and Seismic Hazards***

| Category | Potential Hazard/Concern | None to Slight | Relative Degree of Concern | | | Comments |
|---|---|---|---|---|---|---|
| | | | Low | Moderate | High | |
| Seismic Hazards | * Fault Ground Rupture/Fissures | | | * | * | |
| | * Ground Shaking and Acceleration | | | * | * | |
| | * Liquefaction | | | * | * | |
| | * Lateral Spreading, Seismic Settlement, Differential Compaction | | | * | * | |
| | * Tsunamis | * | | | | |
| | * Seiches | * | | | | |
| | * Flooding (Pipeline, Dam, Aqueduct failure) | | * | * | | |
| | * Landslides, Rockfall, Unstable Cut and Fill | | | * | * | |
| Slope and Foundation Stability, Land Subsidence, Earthworks Construction | * Landslides, Rockfall, Debris Flow, Soil Creep | | | * | * | |
| | * Expansive Soils | | * | * | | |
| | * Collapsible Soils | | * | * | | |
| | * Settlement Potential, Subsidence | | | * | * | |
| | * Fissuring (Groundwater withdrawl) | | | | | Unknown |
| | * Trench Wall Instability | | | * | | |
| | * Rippability | | * | * | | |
| Erosion, Sedimentation, Flooding | * Erosion Potential | | | * | * | |
| | * Alteration of Runoff | | * | * | | |
| | * Unprotected drainage | | | * | * | |
| | * Increased Impervious Surfaces | | * | | | |
| Waste Disposal Problems (On Site Sewage Disposal) | * Change in Groundwater Level | | * | * | | |
| | * Disposal of Excavated Material | * | | | | |
| | * Percolation of Earth Material | | * | * | | |

* Compared to other areas of Southern California, as modified from California Division of Mines and Geology Note 46, Guidelines for Geologic/Seismic Considerations in Environmental Impacts Reports.

## 4.1 Geology and Soils

### 4.1.1 Regional Structural Geologic Setting

**Introduction.** The geology of the Redlands Planning Area forms an extremely important part of the physical development of the region, its unique attractions, and its specific hazards. The Redlands area lies within the San Bernardino Valley, which is the lowland area lying south of the San Bernardino Mountains and north of the hills and mountains of the Peninsular Ranges. This valley, or basin, is actually very young and is a direct product of the merging of the San Andreas and the San Jacinto fault zone complexes. The Redlands area was offset northerly along the San Andreas fault from its original position adjacent to the Chocolate Mountains near the Salton Sea. Fault zones such as the San Jacinto have further disrupted the geologic structure in the Redlands area west of the San Andreas and have, in part, taken up some of the motion originally concentrated on segments of the San Andreas fault zone. The faults in the Redlands Planning Area are of different ages and activities and pose significantly different concerns or hazards. Understanding the history and role of faulting in a regional (southern California) setting, therefore, should assist with the evaluation of the specific concerns associated with each local Redlands area fault and it's probable interaction with the neighboring geology.

**Setting.** Based on it's plate tectonic setting, the geology of southern California may be depicted as a series

of huge structural blocks bounded by individual faults within the San Andreas fault system (see Regional Generalized Geologic Map, MEA Figure 4.1). Most of the individual blocks, or slices, are moving laterally past each other as more western blocks move to the north relative to the more easterly blocks. As an example, in the general vicinity of the Redlands Planning Area, the large and fairly intact Peninsular Ranges are colliding with the fairly massive and highly distorted east-west trending Transverse Ranges. The north-west trending Peninsular Ranges form a large crustal beam of rock that includes all of Baja, most of San Diego County and portions of Riverside, Orange, and San Bernardino Counties. This large, rigid block has collided with the Transverse Ranges, which are so named because they are oriented transverse to the orientation of nearly all other mountain ranges in the southern California region. The glancing collision of these two blocks has produced a complex linkage of faults from the Salton Trough through the Cajon Pass, north of Redlands. The Planning Area lies entirely within this complex collision region.

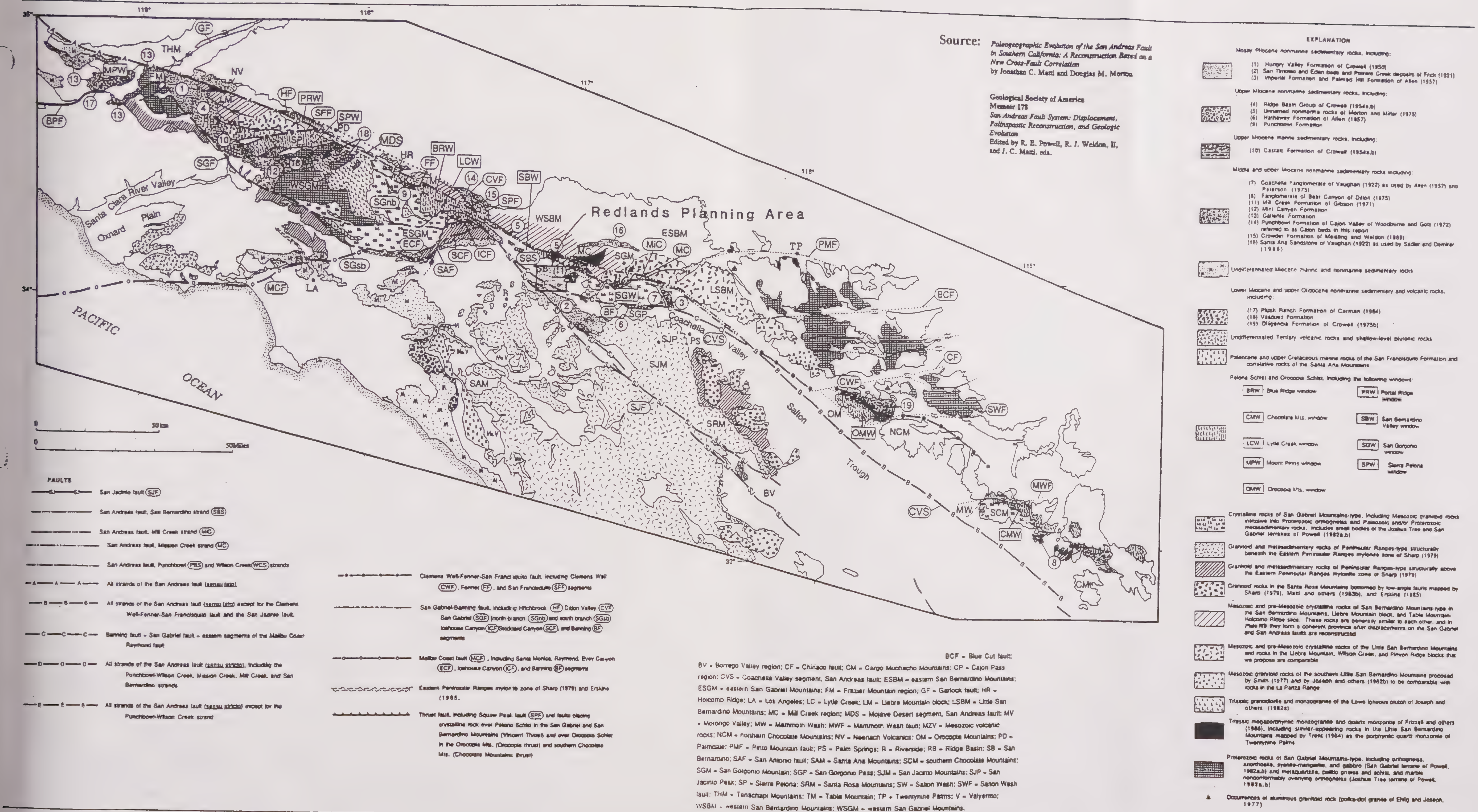
Evidence of this general block motion is also depicted in the Planning Area. The Redlands-San Bernardino Valley area is situated primarily on one down-dropped or recessed block that is being impacted by elevated blocks all around it. The southern portion of the San Bernardino Mountains form a large crustal block that is itself moving north, but is at a significant acute angle to the main northerly block motion. As a consequence, the San Bernardino Mountains block is colliding with the adjacent bordering blocks and being squeezed upward to produce a mountain range. Furthermore, the San Bernardino Valley is being pushed downward beneath the mountain range, but is also sliding by and being disrupted by its motion with the blocks all around it. Simple sideways (strike-slip) motion along the San Andreas system of faults within the Planning Area is far more complicated when compared with the overall southern California region; and, has produced faults associated with compression, extension, and strike-slip movement. Deformation associated with all three types of movement in the vicinity of the Planning Area has resulted in a complex series of faults and a wide variety of geologic units, ranging from recent alluvium to Cenozoic sedimentry rock to Mesozoic metamorphic and granitic rocks (References 44 and 55).

### 4.1.2 Planning Area Structural Geologic Setting With Geologic Units

The San Andreas fault zone is regarded as the largest through-going fault in the immediate vicinity of the Planning area. What is termed the San Andreas is actually composed of numerous fault strands that traverse the base of the mountains along the northern portion of the Planning Area. The different strands of the San Andreas separate the San Bernardino Mountains block, which is being actively pushed upward and over the block composed of the San Bernardino Valley area. This uplift of the mountains and relative down-dropping of the valley is occurring during both major earthquakes and during non-seismic (slow) creep.

A fault that is distinctly younger than the San Andreas forms the southern boundary of the San Bernardino Valley and Planning Area. This fault, the San Jacinto, is geometrically related to the older San Andreas fault in being a new strand that has developed after portions of the San Andreas have apparently become locked, or too strong to allow continued motion to occur along them. The Redlands area is thus in a region where motion is being lateraled or transferred from one fault to another and then back again. Activity on almost any of the faults in the region will produce associated motion, either seismically or without seismic motion (aseismically). The resultant faults associated with this transfer zone between the San Andreas and the San Jacinto faults has produced the Crafton Hills horst and graben complex. Specific faults within the Crafton Hills fault complex include: the Reservoir Canyon, Crafton Hills, Western Heights, Redlands, and the Chicken Hills fault. A detailed description of seismicity and faulting within the Planning Area is described in MEA Section 4.2, Faulting and Seismicity.

Debris dumped from the rising highs via fault activity into the developing lows or valleys has produced the surficial geology in the Planning Area and is a direct recording of the structural activity between the fault blocks. The various geologic units that occur in the Planning Area as a result of faulting, uplift and erosion are depicted on the Generalized Geologic Map, MEA Figure 4.2. A general description of the surficial alluvial units, bedrock units and overlying soil is as follows:




Redlands Planning Area
MEA Figure 4.1

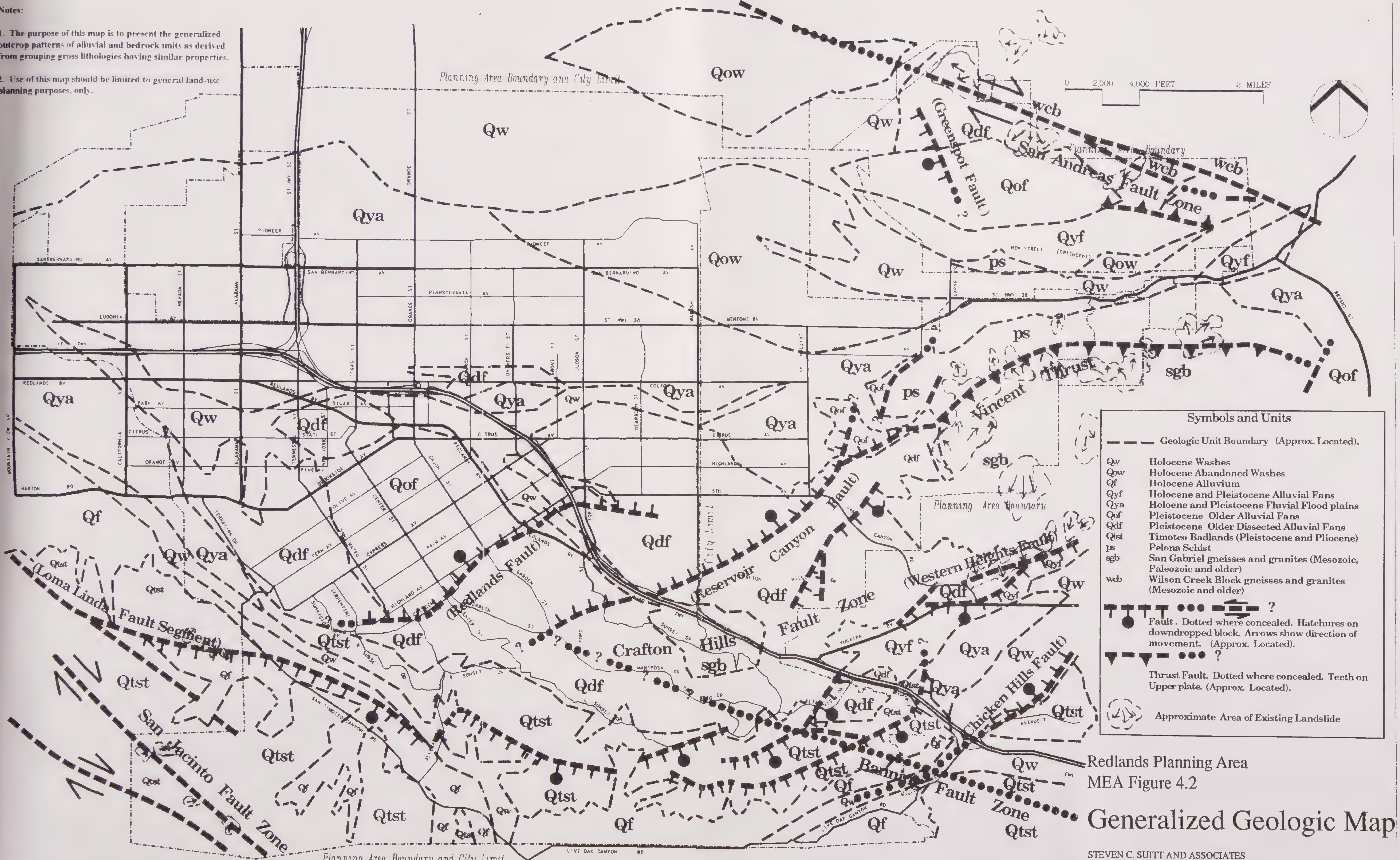
# Regional Generalized Geologic Map

STEVEN C. SUITT AND ASSOCIATES
Consulting Engineering, Mining and Environmental Geologists, Hydrogeologists and Earth Science Professionals

**Notes:**

1. The purpose of this map is to present the generalized outcrop patterns of alluvial and bedrock units as derived from grouping gross lithologies having similar properties.

2. Use of this map should be limited to general land-use planning purposes, only.




Redlands Planning Area
MEA Figure 4.2

# Generalized Geologic Map

STEVEN C. SUITT AND ASSOCIATES
Consulting Engineering, Mining and Environmental Geologists, Hydrogeologist and Earth Science Professionals

Source: Matti, Morton and Cox, 1992, Distribution and Geologic Relations of Fault Systems in the Vicinity of the Central Transverse Ranges, Southern California. USGS Open File Report 92-354.

#### 4.1.2.1 Surficial Units

The principal surficial units within the Planning Area, which record the most recent portion of the geologic history of the region, consist of the following:

- Pliocene and Quaternary sedimentary rocks (Map Units Qtst, Qof and Qdf): These sedimentary rocks record the relative vertical uplift of the adjacent mountains along the San Andreas, San Jacinto, and related fault systems. The San Timoteo Formation (Qtst) and older alluvial units (Qof and Qdf) record the earlier uplift of the mountain areas and deposition of sediments filling the San Bernardino Valley. In general, these sediments form a thin veneer overlying the much older crystalline rocks. Currently, uplift and lateral movement along the San Jacinto fault is causing erosion of the earlier formed Badlands sediments creating alluvial filling of the valley floor from the south.

- Younger alluvial units (Map Units Qw, Qow, Qf, Qyf and Qya): The types of alluvial deposits found within the Planning Area include alluvium associated with modern washes (Qw), older wash deposits (Qow), young alluvium (Qf), young alluvial fan deposits (Qyf), and flood plain deposits (Qya). Most of these sediments were deposited in major floods or storms. The sediments record the events, but also cover much pre-existing evidence of historic geologic events.

#### 4.1.2.2 Bedrock Units

Within the Planning Area, the principal bedrock units that record the older portion of the geologic history of the region, consist of the following:

- Precambrian granitic and metamorphic rocks (Map Unit wcb): These older rocks make up much of the San Bernardino Mountains in the northern Planning Area. They are generally referred to as the Mesozoic Wilson Creek Block gneisses and granites. These rocks are highly variable in their compositions, record many previous deformations, and are severely disrupted by the brittle faulting of the San Andreas system. These shattered rocks are being pushed upward along the modern San Andreas and provide both the elevation and the highly broken rock that produces unstable slopes, landslides and alluvial source material.

- Pelona-Orocopia Schist (Map Unit ps): This rock unit underlies the Precambrian rocks in the San Gabriel Mountains and in the Orocopia-Chocolate Mountains, from which the Redlands area was connected in pre-San Andreas time. These rocks underlie much of the Redlands Planning Area and are exposed within the northern Crafton Hills and as small hills in the San Bernardino Valley. These rocks are well foliated (layered) and structurally weak on a crustal scale. Slopes can be very unstable along foliation surfaces, as in some portions of the northern Crafton Hills.

- Mesozoic granitic rocks (Map Unit sgb): This rock unit comprises much of the area southeast of the Planning Area and overlie the Pelona Schist in the Crafton Hills. Within the Planning Area, this unit has been referred to as the Mesozoic San Gabriel gneisses and granites. These solid, relatively brittle rocks generally break along well-defined fault zones. However, because the San Jacinto is a fairly young fault in these rigid granitic rocks, this unit breaks along innumerable small, en echelon fault surfaces. This produces a pattern of faults at a slight angle to the main fault and forms a broad fault zone.

#### 4.1.2.3 Soil Units (Soil Conservation Service Soil Series)

The principal soil units or soils series within the Planning Area are described by the U.S. Department of Agriculture (USDA) Soil Conservation Service (SCS). In general, the development of soil profiles records the surficial weathering of the underlying rock and alluvial units.

- The general soil map shows that portions of Redlands south of the Santa Ana River Wash and in a line running from north of the San Timoteo Canyon Wash area to the Crafton Hills are comprised of two major soil associations, the Hanford-Greenfield-San Emigdio association, and the Ramona-Chualar-Sorrento association. Both of these associations are characterized by their occurrence in areas which are nearly level to areas of moderate slope. Soils may be expected to be dominantly brownish, moderately textured, well-drained, and deep.

The Ramona-Chualar-Sorrento soil association occurs primarily on the alluvial fans and terraces between San Timoteo Canyon, and the Crafton Hills. The Hanford-Greenfield-San Emigdio and the Tujunga-Soboba association soils occur primarily on the alluvial valley floor, as well as on the alluvial fans bordering the surrounding hilly areas.

The soils covering the Crafton Hills are known as the Cieneba-Tollhouse-Friant association. These soils are characteristically steep, excessively drained, and shallowly overlie the schist and granite bedrock below. The soil association overlying the sandstone and the siltstone of the San Timoteo Canyon hills and the Badlands is known as the Saugus-Fontana-Nacimiento association, and soils are generally steep, well-drained, and range from moderately deep to deep.

### 4.1.3 Principal Geotechnical Hazards (Impacts) and Constraints

Based on known geological and geotechnical conditions within or in the vicinity of the San Bernardino Valley, the following geotechnical factors may potentially impact the Redlands Planning area;

- Erodability of soil and rock,
- Slope Instability; such as: natural and man-made landslides, rockfall, mud/debris flow and soil creep,
- Subsidence (groundwater withdrawal),
- Expansive soils,
- Compressible/collapsible soil,
- Percolation potential/effluent disposal, and
- Rippability (Blasting).

#### 4.1.3.1 Erodability of Soil and Rock

The potential for natural erosional type hazards is most likely to be high in those Planning Areas with a combination of the following conditions: 1) moderately steep to steep slopes (>15%), 2) loose to unconsolidated soils and sediments, 3) little or no vegetation cover, and 4) uncontrolled surface water runoff. Development or earth work modifications in the Planning Area can alter the topography to create steeper slopes, remove surface vegetation and increase the amount of surface water runoff. Changes in any of the above conditions can increase erosion potential, as well as cause surface rilling. Additionally, an increase in erosion can increase downstream sediments loads with deposition of sediments. An increase in sedimentation as a result of increased erosion could significantly impact the tributaries of Reservoir, Live Oak and San Timoteo Canyons and Mill Creek.

The Redlands Hillside Development Overlay District (Ordinance 2030) bases development density allowances on slope, expressed in percent, and soil type. Development on slopes of 15 to 30 percent (15 to 30 foot rise in a 100 foot run) or more, and where the Saugus and San Timoteo sandy loam soil series occurs is restricted. A general discussion of slope and erodible soil impacts of the Planning Area follows.

Slopes of greater than 30 percent occur throughout San Timoteo Canyon and in the Crafton Hills, as well as north of the Mill Creek channel. Slopes of between 15 and 30 percent, which also occur throughout these areas, are additionally scattered throughout the Planning Area. Slopes are shown on GP Figure 5.3. Slopes are based on USGS digital elevation models, using 30-meter sampling of elevation values. Because of the sample size, the figure should be used for general planning purpose only, and is not intended to preclude the need for site-specific study.

Steep slopes combined with certain erodible soil types are recognized as hazardous because construction grading temporarily decreases vegetation coverage and may increase surface water runoff. This condition is especially evident in Saugus and San Timoteo sandy loam soils, which formed on uplands in weakly consolidated sediments, and are commonly found on slopes of 30 to 50 percent. These two soil types are characterized as having rapid runoff and high erosion potential where soil is left bare. Based on slope steepness, runoff and soil characteristics, the above soils types are considered to have very high to high erosion potential.

Soil types recognized by the Soil Conservation Service as having a high erodibilty hazard which may indicate potential limitations for construction and development within the Planning Area are the Cieneba-Friant sandy loams and the Ramona sandy loams found on 15 and 30 percent slopes. Cieneba-Friant sandy loams are typically found on steep slopes where rapid runoff is evident. Where this soil type has established vegetation, the erosion potential is considered moderate. Within the Planning Area, the Cieneba-Friant soil types occur mainly along the northern and western face of the Crafton Hills, probably overlying Pelona Schist or granitic (crystalline) bedrock. In contrast to the Cieneba-Friant sandy loam, Ramona sandy loams tend to develop on alluvial fans and terraces. Runoff on these slopes in the Redlands area is described as medium to rapid, and the hazard or erosion potential is moderate to high on bare soil. Ramona sandy loams on 15 to 30 percent slopes are moderately eroded in most areas with shallow gullies, and deeply gullied in a few areas. These soils are found in various locations in San Timoteo Canyon, on slopes in the South Redlands area, in the Crafton hills, and in the hills north of the Mill Creek channel.

Those soils with moderate to high erosion potential as indicated by the Soil Conservation Service are the Greenfield, Hanford and gently sloped Ramona sandy loams that occur on 9 to 15 percent slope. These soil types generally form on the alluvial valley floor, fans and terraces.

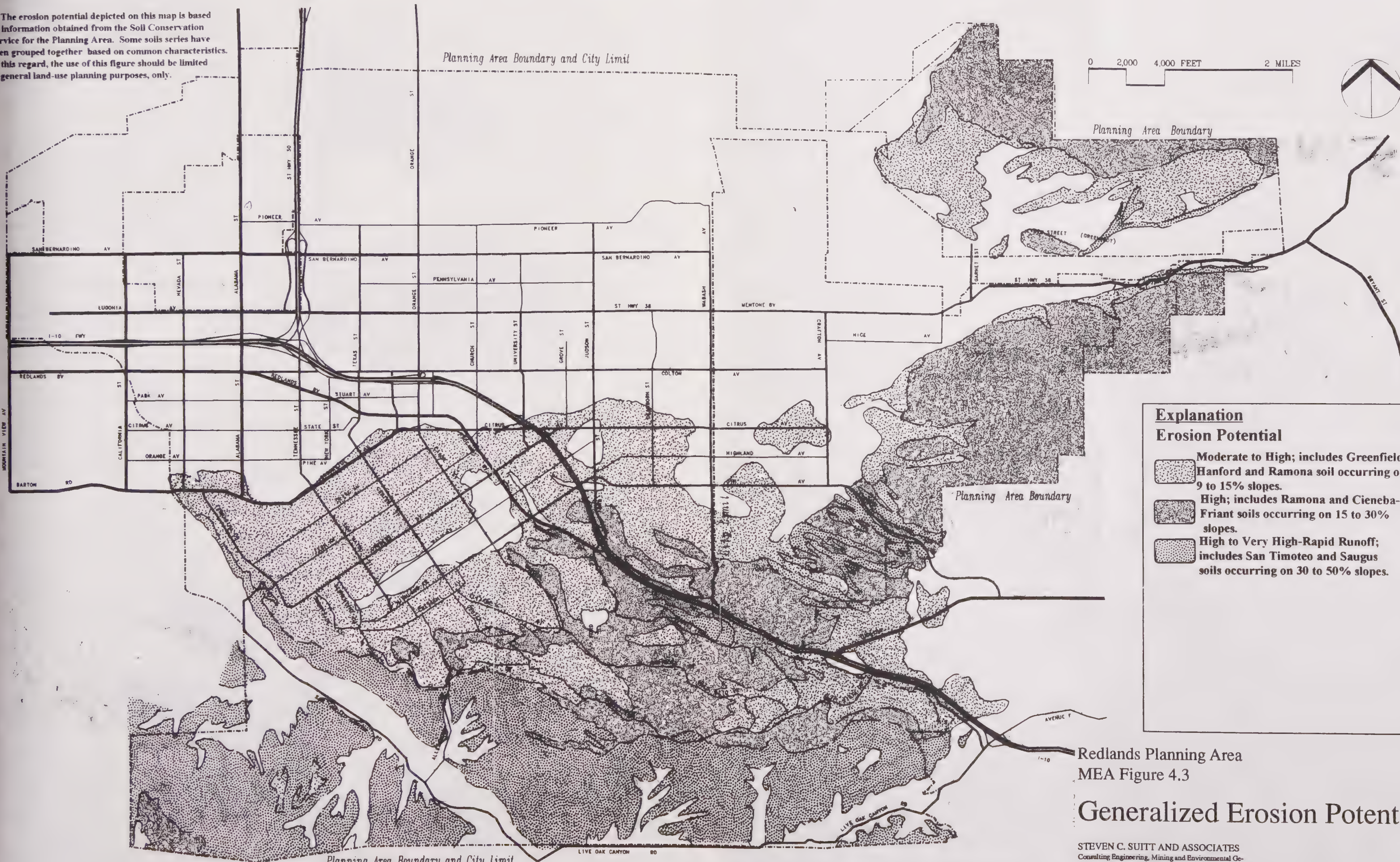
MEA Figure 4.3, Generalized Erosion Potential, depicts those soil types considered to have a moderate to high, high, and high to very high erosion potential. In general, erosion potential is based on soil type and slope within the Planning Area.

#### 4.1.3.2 Slope Instability

Slope instability includes landslides (both natural and man-made), rockfall, mud/debris flows and soil creep. Geotechnical features or factors that influence or affect slope instability include: adverse geologic structure or conditions, such as existing bedding, joints, faults, and ancient landslides; inherent zones of weak rock; expansive or unconsolidated soils; high rainfall or groundwater (seepage, irrigation or subsurface effluent disposal), earthquakes (see seismic section), steep slopes, and changes to topography due to erosion or surface alterations (i.e., grading).

Notes:

1. The erosion potential depicted on this map is based on information obtained from the Soil Conservation Service for the Planning Area. Some soils series have been grouped together based on common characteristics. In this regard, the use of this figure should be limited to general land-use planning purposes, only.




## Explanation

### Erosion Potential

- Moderate to High; includes Greenfield, Hanford and Ramona soil occurring on 9 to 15% slopes.
- High; includes Ramona and Cieneba-Friant soils occurring on 15 to 30% slopes.
- High to Very High-Rapid Runoff; includes San Timoteo and Saugus soils occurring on 30 to 50% slopes.

Redlands Planning Area
MEA Figure 4.3

# Generalized Erosion Potential

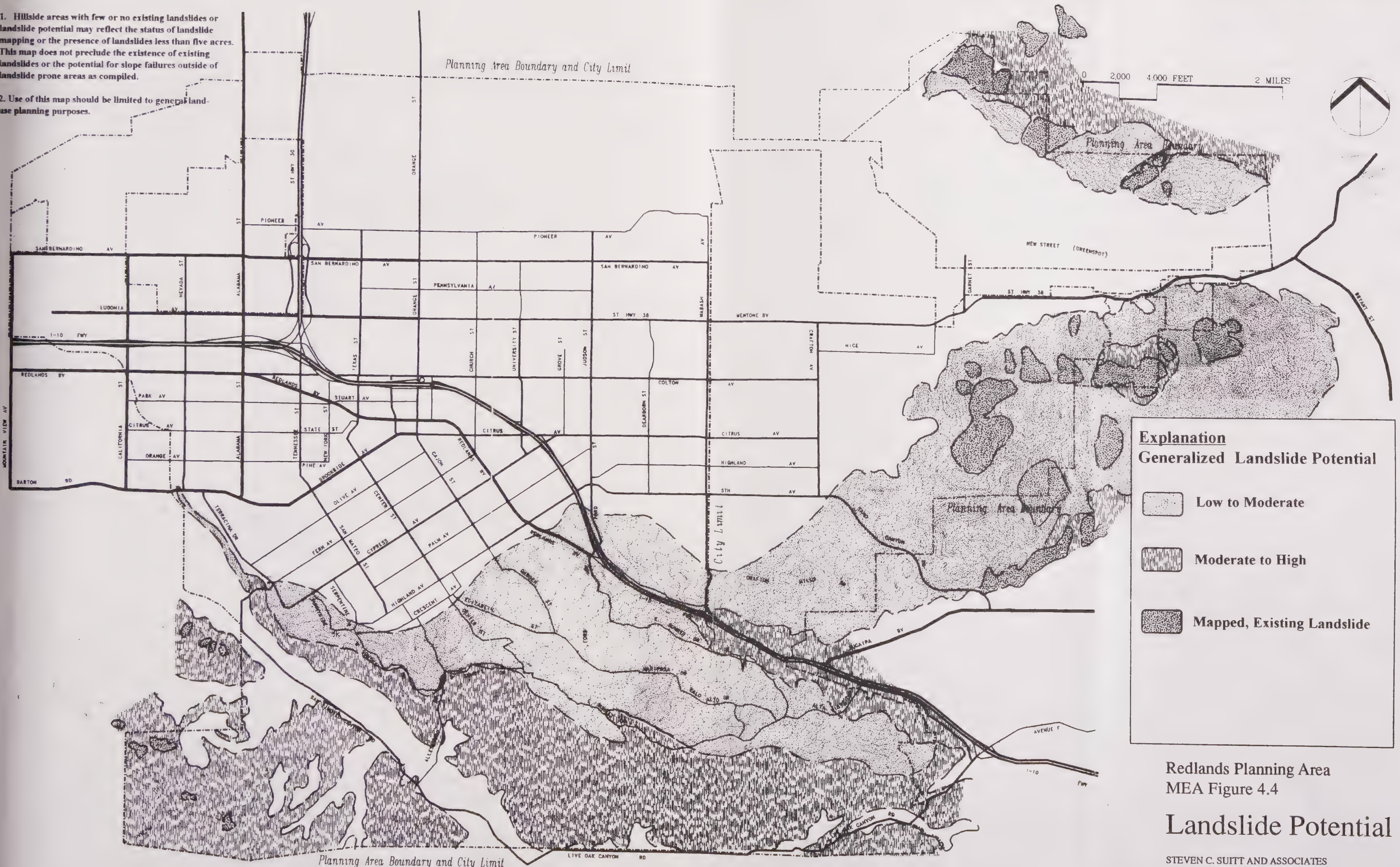
STEVEN C. SUITT AND ASSOCIATES
Consulting Engineering, Mining and Environmental Geologists, Hydrogeologist and Earth Science Professionals

**Source: USDA, Soil Conservation Service, 1980, Soil Survey of San Bernardino County, Southwestern Part, California.**

Notes:

1. Hillside areas with few or no existing landslides or landslide potential may reflect the status of landslide mapping or the presence of landslides less than five acres. This map does not preclude the existence of existing landslides or the potential for slope failures outside of landslide prone areas as compiled.

2. Use of this map should be limited to general land-use planning purposes.




Redlands Planning Area
MEA Figure 4.4

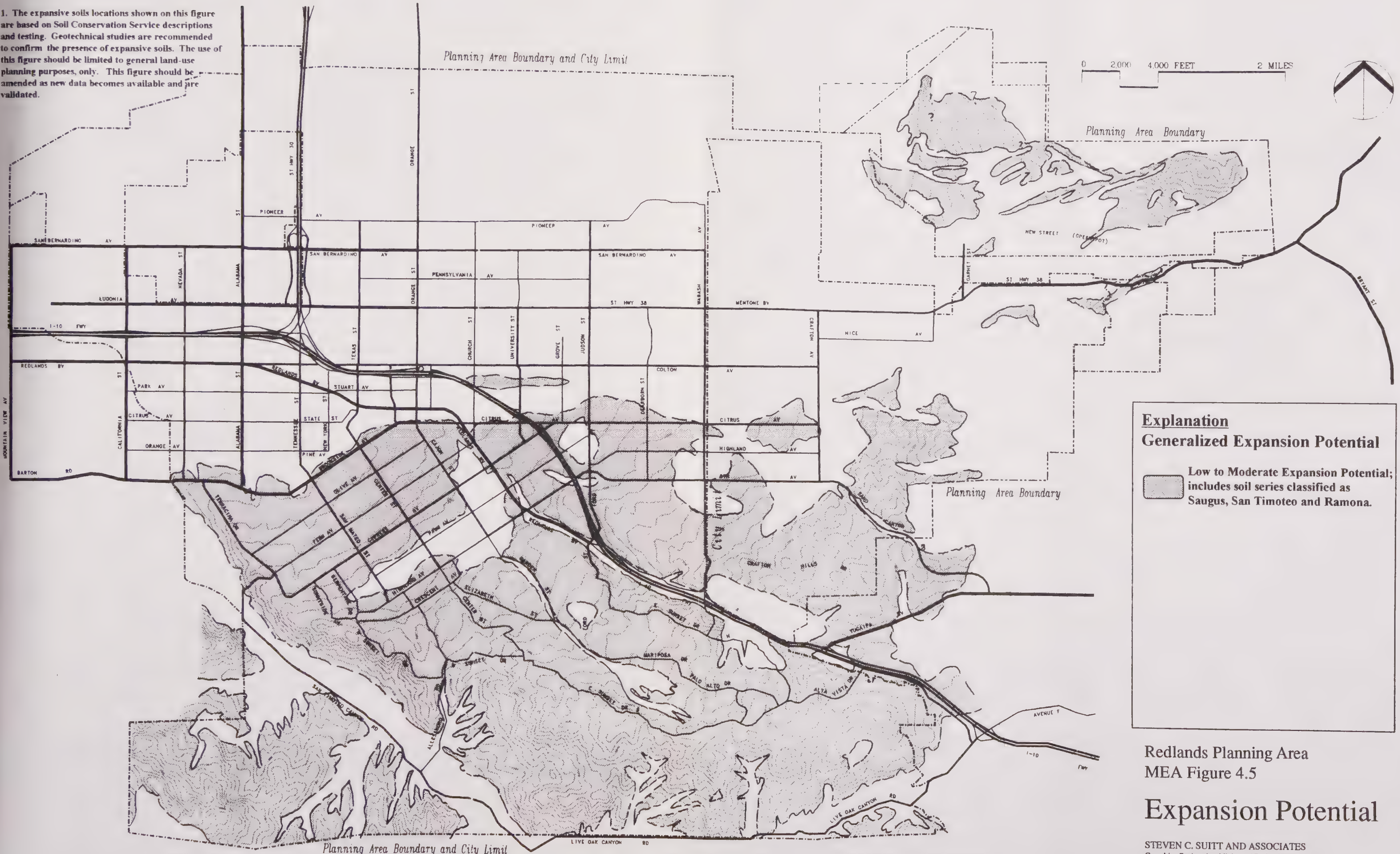
# Landslide Potential

Source: San Bernardino County Official Land Use Plan, General Plan, Geologic Hazard Overlay; Morton, 1978 and 1990; Matti, et. al. 1992; and Tan, S.S., 1989.

STEVEN C. SUITT AND ASSOCIATES
Consulting Engineering, Mining and Environmental Geologists, Hydrogeologist and Earth Science Professionals

Notes:

1. The expansive soils locations shown on this figure are based on Soil Conservation Service descriptions and testing. Geotechnical studies are recommended to confirm the presence of expansive soils. The use of this figure should be limited to general land-use planning purposes, only. This figure should be amended as new data becomes available and are validated.




## Explanation

## Generalized Expansion Potential

**Low to Moderate Expansion Potential; includes soil series classified as Saugus, San Timoteo and Ramona.**

Redlands Planning Area
MEA Figure 4.5

# Expansion Potential

STEVEN C. SUITT AND ASSOCIATES
Consulting Engineering, Mining and Environmental Geologists, Hydrogeologist and Earth Science Professionals

**Source: USDA, Soil Conservation Service, 1980, Soil Survey of San Bernardino County, Southwestern Part, California.**

emphasis on the presently active San Andreas Fault System. Additional information on the structural geologic history of this region is presented in MEA Sections 4.1.1 and 4.1.2 or can be obtained from the sources cited in the references.

- **Vincent Thrust compressional system.** After formation of the diverse rocks that make up the San Bernardino Mountains from Precambrian to Mesozoic time, the first major structural event was the stacking of the granitic rocks of the region above the Pelona-Orocopia Schist. This stacking occurred by several processes along a contact that is generally referred to as the Vincent Thrust approximately 75 to 70 million years ago. Stacking of the hard granitic rocks above the weaker Pelona-Orocopia Schist has, in part, helped determine the fault geometries and styles of deformation of the San Bernardino Valley region. The boundary between these two major rock units is well exposed along the northern edge of the Crafton Hills (barbed thrust fault). This old and clearly inactive fault can be inferred to cross nearly the entire Planning Area as exposed at the surface or buried at depth. Detailed seismic monitoring in this region suggests that this boundary between the Pelona Schist and more brittle granitic rocks is identifiable on a regional scale and may control the localization of much of the seismicity.

- **Middle Tertiary extensional system.** Disruption of the Mesozoic stacking of the Pelona Schist and overlying granitic rocks occurred during middle Tertiary time (approximately 25 to 12 million years ago) along much of the Orocopia-Chocolate Mountains region (from which the Redlands area has been offset) by crustal extension along regional normal faults. The major effect of these extensional faults was to bring the Pelona Schist to the Earth's surface and thin the crust. The thinned portions of the crust appear to have controlled the later development of the San Andreas fault system, because these thin zones were the weakest areas for initiating through-going strike-slip faults.

  Tilting of the Pelona-Orocopia Schist and overlying crystalline rocks that make up the Crafton Hills may have originally occurred along one of these regional normal faults, or detachment faults. This may be particularly significant because it would suggest that the general Crafton Hills area is underlain by a fault tilted to the north that would intersect with the San Andreas at depth. This fault may have helped localize the later thrust motion along portions of the San Andreas system here and be similar in some ways to the blind thrusts that moved in the Whittier Narrows and Northridge earthquakes. Little is currently known about the specific effects of mid-Tertiary detachment faulting in the study area, although areas such as the Orocopia Mountains and the nearby Santa Rosa Mountains contain beautifully exposed faults of this type.

- **San Andreas strike-slip system.** When the plate tectonic motions changed into strike-slip deformation rather than the earlier extensional faulting (about 12 Ma), the tilted extensional fault basins became the sites for the regional strike-slip faults like the San Andreas. Earthquakes related to the San Andreas are controlled in part by the strong-versus-weak nature of the rocks and the presence of pre-existing faults that helped control the initial location of faults of the San Andreas system. The Planning Area contains faults of different ages. Some faults are of seismic concern, others are not. Still others are part of a pre-existing system and yet may help control modern seismicity. The full histories of many of the faults in the San Bernardino Valley area are currently not well understood.

The San Gorgonio Pass segment of the San Andreas is part of a complex zone of compression, termed a restraining bend. In the San Gorgonio Pass area, this fault tilts to the north and probably intersects the main segment of the San Andreas at depth. Major ground accelerations may be expected in the vicinity of this fault

and in the region between its surface exposure and the San Andreas proper. The Banning fault is, in part, related to this same geometry and effectively takes up some of the same compressional motion until it transfers its offset to the San Jacinto fault.

Major parts of this distributed system are the series of normal faults that dissect the San Bernardino Valley and drop blocks down from the elevation of the Crafton Hills to lower levels. Faults such as the Western Heights, Chicken Hill, Reservoir Canyon, Redlands and others are extensional faults that help transfer motion through the main San Bernardino Valley block from the San Andreas and other structures to the San Jacinto fault (References 44, 54 and 55). These faults will probably move when either the San Andreas or the San Jacinto faults move. The subsurface geometries of these faults could be very important for evaluating seismic risk in the region. Significant motion might be expected on these faults during a seismic collapse as a result of longterm creep on different parts of the San Andreas and San Jacinto fault zones within the Planning Area.

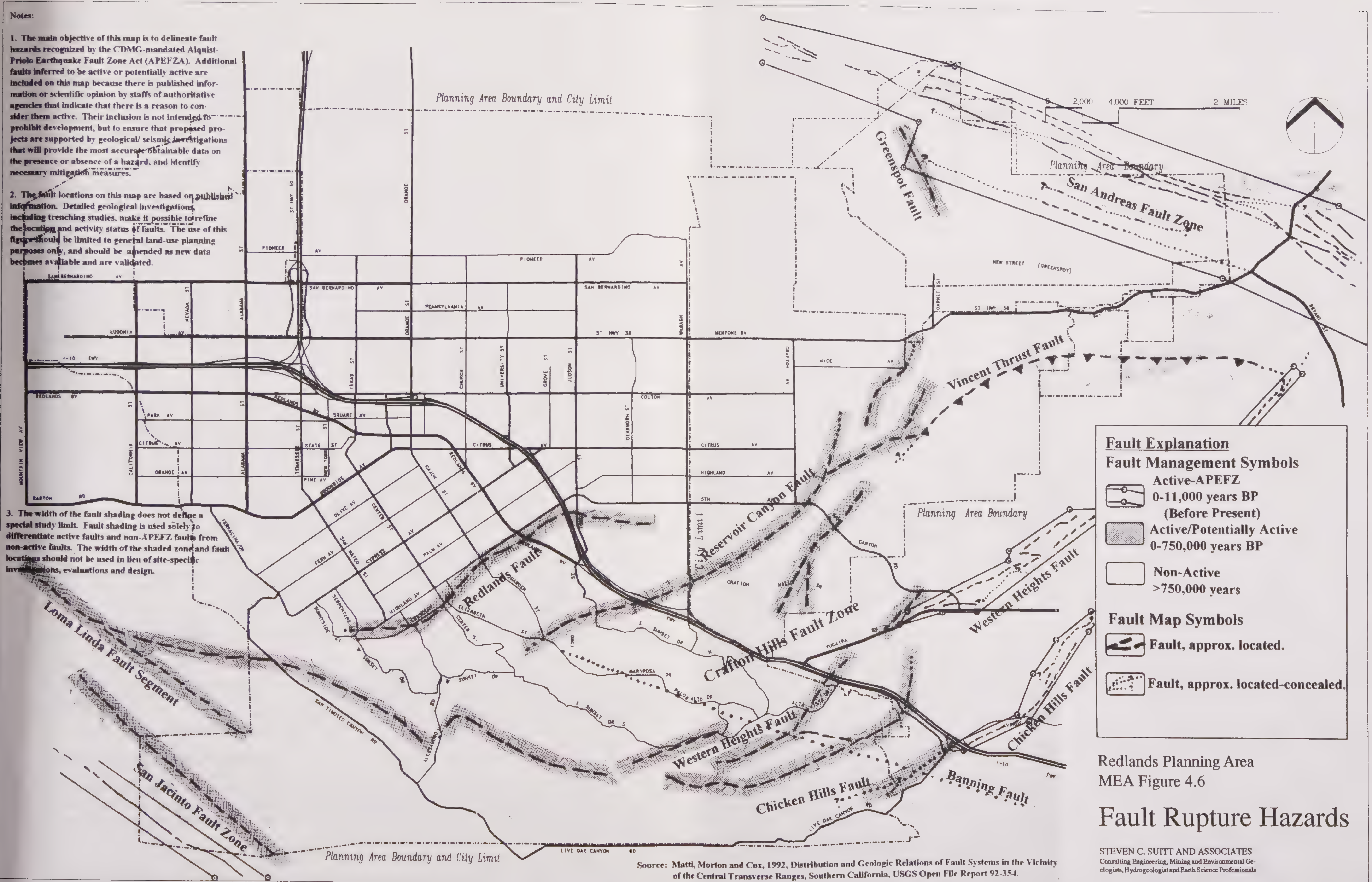
### 4.2.2 Fault Systems and Seismicity

#### 4.2.2.1 Fault Systems Within the Redlands Planning Area

Several seismically inactive, active and potentially active faults either transect or are in close proximity to the Planning Area. The surface exposures of the San Bernardino Valley segment of the San Jacinto Fault zone and the San Bernardino Mountains segment of the San Andreas fault zone are located along the northeast and southwest boundaries of the Redlands planning area, respectively. Another set of faults known as the Crafton Hills horst and graben fault system (complex) trend northeast and are located between the San Andreas and San Jacinto Fault zones. As discussed in MEA Section 4.1, this fault complex formed as a product of sympathetic movement from rupture associated with motion transfer between the San Andreas and San Jacinto fault zones. These northeast trending faults are delineated from west to east as the Redlands, Reservoir Canyon/Crafton Hills, Western Heights and Chicken Hills faults. Large portions of the Western Heights and Chicken Hills fault segments of this complex are located outside of the Planning Area to the southeast. Three other fault segments: the Greenspot, Loma Linda and the Banning faults are located somewhat parallel to and considered part of either the San Jacinto and the San Andreas fault zones. An older fault system, known as the Vincent Thrust, also occurs in the Crafton Hills portion of the Planning Area. The approximate location of all of the above faults is depicted on MEA Figure 4.6, Fault Rupture Hazards. A discussion of these faults and associated activity or history, as it pertains to the Planning Area, follows:

- **Definition of active faults.** The presence of a fault in a given area does not imply the inevitability of an earthquake there, since many of the State's faults have not been active for thousands or even millions of years. To help identify areas of concern, the State Department of Mines and Geology (CDMG) Fault Evaluation Program has the task of identifying potentially active faults in areas which should be zoned for inclusion in the Alquist-Priolo Earthquake Fault Zones. (See below for discussion of Fault Rupture Hazard Zones.) The CDMG defines potentially active faults as those considered to have been active during Quaternary time, about the last two million years. Since this category encompasses so many faults, the CDMG has further refined its analysis by identifying those faults which have a relatively high potential for future activity, meriting concern because they have been sufficiently active, and those faults which have reasonably well-defined surface traces.

  A fault is deemed sufficiently active if there is evidence of Holocene (last 10-12,000 years) surface displacement along one or more of its segments or branches, as evident either through direct observation or inference. A well-defined fault, as established by the CDMG, should leave a trace which is clearly detectable by a trained geologist as a physical feature at or just below the ground surface, as identified by direct observation, or by indirect methods. (Reference 25).




Notes:

1. The main objective of this map is to delineate fault hazards recognized by the CDMG-mandated Alquist-Priolo Earthquake Fault Zone Act (APEFZA). Additional faults inferred to be active or potentially active are included on this map because there is published information or scientific opinion by staffs of authoritative agencies that indicate that there is a reason to consider them active. Their inclusion is not intended to prohibit development, but to ensure that proposed projects are supported by geological/ seismic investigations that will provide the most accurate obtainable data on the presence or absence of a hazard, and identify necessary mitigation measures.

2. The fault locations on this map are based on published information. Detailed geological investigations, including trenching studies, make it possible to refine the location and activity status of faults. The use of this figure should be limited to general land-use planning purposes only, and should be amended as new data becomes available and are validated.

3. The width of the fault shading does not define a special study limit. Fault shading is used solely to differentiate active faults and non-APEFZ faults from non-active faults. The width of the shaded zone and fault locations should not be used in lieu of site-specific investigations, evaluations and design.

**Fault Explanation**

**Fault Management Symbols**

- Active-APEFZ 0-11,000 years BP (Before Present)
- Active/Potentially Active 0-750,000 years BP
- Non-Active >750,000 years

**Fault Map Symbols**

- Fault, approx. located.
- Fault, approx. located-concealed.

Redlands Planning Area
MEA Figure 4.6

# Fault Rupture Hazards

Source: Matti, Morton and Cox, 1992, Distribution and Geologic Relations of Fault Systems in the Vicinity of the Central Transverse Ranges, Southern California, USGS Open File Report 92-354.

STEVEN C. SUITT AND ASSOCIATES
Consulting Engineering, Mining and Environmental Geologists, Hydrogeologist and Earth Science Professionals

- Alquist-Priolo Earthquake Fault Zone. The Alquist-Priolo Earthquake Fault Zone Act, formerly called Alquist-Priolo Special Studies Zone, went into effect in 1973, and has been amended several times and as recently as 1994. The purpose of this Act is to prohibit the location of most structures for human occupancy across the traces of active faults and to thereby mitigate the hazard of fault rupture. Under the Act, the CDMG is required to delineate Earthquake Fault Zones (EFZ) along active faults in California, and jurisdictions containing these zones must then regulate certain types of development within these zones.

As described above, the basis for inclusion of a fault in a EFZ is evidence of it's recent or potential activity. The San Andreas and San Jacinto faults, which bound the Planning Area, as well as the eastern segments of the Crafton Hills horst and graben fault complex (locally known as the Western Heights and Chicken Hill fault zones) which occur primarily east of the Planning Area, have been classified as Earthquake Fault Zones under the Alquist-Priolo Earthquake Fault Zone Act. Currently, the southwesterly extensions of the Western Heights and Chicken Hills faults transect the southeastern Planning Area, but have not been zoned as Alquist-Priolo EFZ's. Additionally, the entire western segments of the Crafton Hills horst and graben fault complex (known as the Redlands and Reservoir Canyon/Crafton Hills faults) have not been included as of 1995 as Alquist-Priolo EFZ. Based on the tectonic history of the Crafton Hills horst and graben fault complex and information obtained from the USGS (References 54 and 55), the above fault segments that transect the Crafton Hills should be considered to be active, or at a minimum potentially active, unless site specific geologic investigations demonstrate otherwise. Additionally, information received by the County of San Bernardino Geologist combined with studies performed by geologic consultants, indicate that structural setbacks due to fault rupture hazards have been recommended for a portion of the Reservoir Canyon/Crafton Hills fault near Sand Canyon Road in the Planning Area.

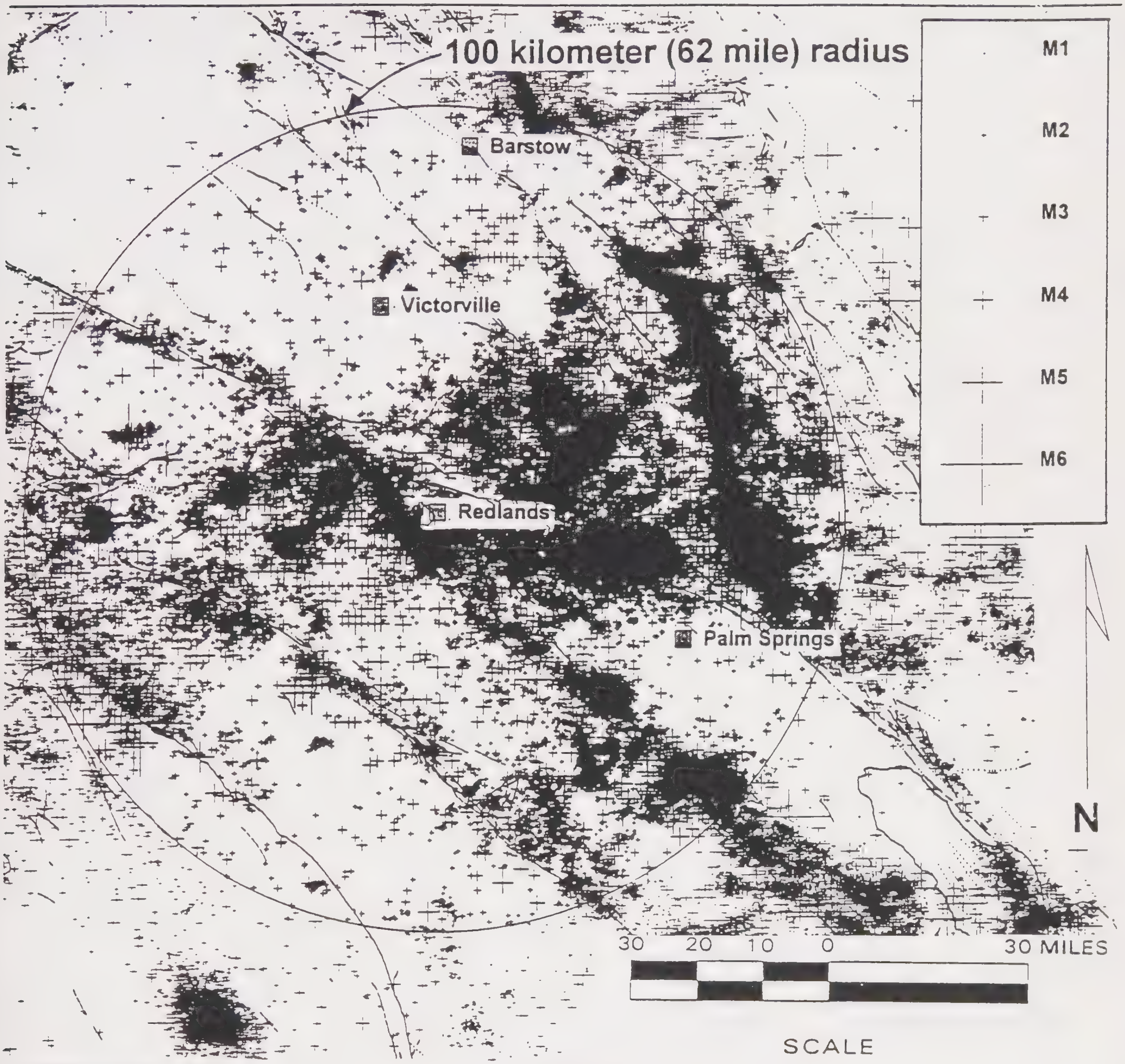
East of the Planning Area, the Banning fault has been zoned for Alquist-Priolo EFZ studies. Recent studies by the USGS and CDMG appear to indicate that potential movement or activity of the western portion of the Banning fault is transferred to either the San Andreas or San Jacinto Faults. Additionally, discussions with the Riverside County Geologist and studies performed by geologic consultants in the vicinity of Calimesa east of the Planning Area, have not been able to establish a conclusive date of Holocene age rupture for evaluation of fault activity on the Banning fault. Additionally, it appears that the Banning fault terminates east of the Planning Area where it transitions into a fold (References 15, 36, 55 and 75). Accordingly, for the purposes of planning, the western segment of the Banning fault that transverses the Planning Area should not be considered as active or potentially active unless site specific investigations demonstrate otherwise.

The Greenspot fault in the northeastern Planning Area and the Loma Linda fault in the southwestern Planning Area are considered to be potentially active by the CDMG due to surface outcrops and geomorphic relationships. According to the San Bernardino County Geologist, studies performed to date have not established activity nor have structural setbacks been recommended by geologic consultants for these features. However, considering the proximity of these features to the active San Andreas and San Jacinto faults, both faults should be evaluated for activity with site specific investigations.

The Vincent Thrust fault within the Western Crafton Hills is probably an abandoned fault complex with corresponding segments located to the west in the San Gabriel Mountains. The Vincent Thrust is considered to be pre-Quaternary in age or older than 1.6 million years (Reference 55); and therefore not considered active by CDMG criteria. MEA Figure 4.6, depicts the fault rupture hazards in the Planning Area. This figure also provides an activity classification for each of the above described faults.

#### 4.2.2.2 <u>Seismicity of Southern California</u>

The location of epicenters of previous earthquakes from 1932 to 1994 in southern California are shown in MEA Figure 4.7, <u>Seismicity Map</u> and Figure 4.8, <u>M4.0 or Greater Seismicity Map</u>. The following are selected southern California earthquakes of magnitude M5.5 or greater that have produced ground shaking in the Planning Area.




EPICENTER SEARCH DATA SHEET

SITE LOCATION 34 06 LAT -117 19 LONG

SCALE 1 1442876

TIME PERIOD 1932-1994

MAGNITUDE RANGE. 1 - 8 9

DEPTH RANGE. -5 - 50 (km)

MINIMUM LOCATION QUALITY C

TOTAL # OF EVENTS ON PLOT 146463

MAGNITUDE DISTRIBUTION OF SEARCH RADIUS EVENTS

| | |
|---|---|
| 1.0-1.9 | 53925 |
| 2.0-2.9 | 23607 |
| 3.0-3.9 | 3896 |
| 4.0-4.9 | 524 |
| 5.0-5.9 | 53 |
| 6.0-6.9 | 4 |
| 7.0-7.9 | 1 |
| 8.0-8.9 | 0 |

TOTAL # OF EVENTS WITHIN SEARCH RADIUS 82010

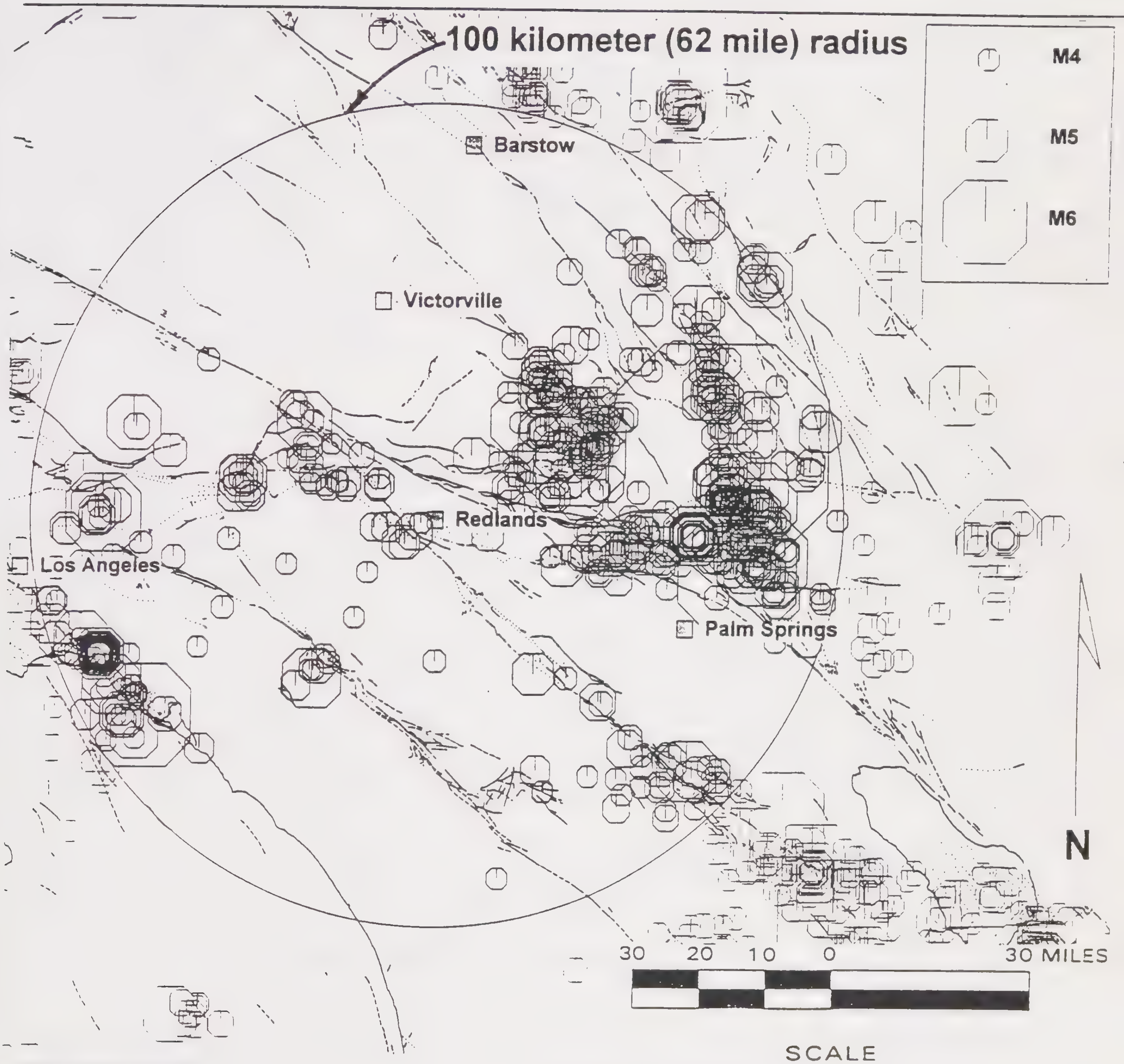
LARGEST 3 EVENTS
7.4 ON SUNDAY JUNE 28 1992 LOCATED APPROX. 71 KILOMETERS EAST OF THE SITE
6.5 ON SATURDAY DECEMBER 04 1948 LOCATED APPROX 75 KILOMETERS EAST OF THE SITE
6.4 ON SUNDAY, JUNE 28, 1992 LOCATED APPROX. 36 KILOMETERS NORTHEAST OF THE SITE

## Seismicity 1932-1994 (Magnitude 1+) 100 kilometer (62 mile) radius

Redlands Planning Area
MEA Figure 4.7

# Seismicity Map

STEVEN C. SUITT AND ASSOCIATES
Consulting Engineering, Mining and Environmental G




EPICENTER SEARCH DATA SHEET

SITE LOCATION: 34.06 LAT -117.19 LONG.

SCALE 1: 1442876

TIME PERIOD: 1932-1994

MAGNITUDE RANGE: 4.0- 8.9

DEPTH RANGE: -5 - 50 (km)

MINIMUM LOCATION QUALITY: C

TOTAL # OF EVENTS ON PLOT: 1337

SEARCH RADIUS: 100 KILOMETERS

MAGNITUDE DISTRIBUTION OF SEARCH RADIUS EVENTS:
4.0- 4.9 : 524
5.0- 5.9 : 53
6.0- 6.9 : 4
7.0- 7.9 : 1
8.0- 8.9 : 0

TOTAL # OF EVENTS WITHIN SEARCH RADIUS 582

LARGEST 3 EVENTS:
7.4 ON SUNDAY, JUNE 28 1992 LOCATED APPROX. 71 KILOMETERS EAST OF THE SITE
6.5 ON SATURDAY, DECEMBER 04 1948 LOCATED APPROX. 75 KILOMETERS EAST OF THE SITE
6.4 ON SUNDAY, JUNE 28, 1992 LOCATED APPROX. 36 KILOMETERS NORTHEAST OF THE SITE

## Seismicity 1932-1994 (Magnitude 4.0+) 100 kilometer (62 mile) radius

Redlands Planning Area
MEA Figure 4.8

# M4.0 or Greater Seismicity Map

STEVEN C. SUITT AND ASSOCIATES
Consulting Engineering, Mining and Environmental Ge-

| Earthquake | Date | Magnitude |
|---|---|---|
| Northridge | January 17, 1994 | 6.7 |
| Big Bear | June 28, 1992 | 6.6 |
| Landers | June 28, 1992 | 7.5 |
| Joshua Tree | April 22, 1992 | 6.3 |
| Upland | February 28, 1990 | 5.5 |
| Whittier-Narrows | October 1, 1987 | 5.9 |
| Palm Springs | July 8, 1986 | 5.6 |
| Desert Hot Springs | December 4, 1948 | 6.5 |
| Manix | April 10, 1947 | 6.2 |
| San Gorgonio Pass | June 12, 1944 | 6.2 |
| San Bernardino-Loma Linda | July 23, 1923 | 6.2 |
| E. San Bernardino Mountains | September 19, 1907 | 5.5-6 |
| Lytle Creek - San Bernardino Mts. | July 22, 1899 | 6.5 |

In the past 150 years of California's recorded earthquake history, no earthquakes of magnitude (M)≥ 7 have occurred on the San Bernardino Valley segment of the San Jacinto Fault zone (References 72 and 73). An earthquake of M6.3 occurred about 5 miles south of San Bernardino in 1923 on or near the San Bernardino Valley segment of the San Jacinto Fault zone. Earthquakes of M6.5 to 7 occurred in the San Jacinto-Hemet area in December 1899 and April 1918 and 12 miles southeast of the San Bernardino Valley segment. The largest earthquakes in proximity to the Redlands planning area occurred in Big Bear and Landers on June 28, 1992 (M6.6 to M7.5) and in Joshua Tree on April 22, 1992 (M6.3) (Reference 74).

Earthquakes occurring on the San Jacinto and San Andreas fault zones would produce significant ground shaking in the Planning Area. The 30 year probability of a M6.9 earthquake occurring on the San Bernardino Valley segment of the San Jacinto fault zone is calculated as 37 percent (References 1 and 73). The 30 year probability for a M7.3 earthquake occurring on the San Bernardino Mountains segment of the San Andreas fault is 28 percent (Reference 1 and 73). Although estimations of 30 year probable earthquakes are important for planning purposes, it should be noted that the maximum credible earthquake for the southern California segment of the San Andreas fault is calculated as M8.3 (Reference 14).

In summary, the Redlands Planning Area is located in a seismically active area of southern California and potential impacts from local or distant large event earthquakes is highly likely. The principle seismic hazards that may impact the Planning Area are discussed below in Section 4.2.3.

### 4.2.3 Principal Seismic Hazards (Impacts) and Constraints

Earthquake impacts include primary effects such as surface rupture and to some extent ground shaking, and secondary effects that include: liquefaction, lateral spreading, seismic settlement and differential compaction, earthquake induced flooding (i.e., tsunamis, seiches, dam, pipeline or aqueduct failure), landsliding and rockfall.

#### 4.2.3.1 Primary Effects of Seismic Hazards

**Surface Rupture.** Surface rupture is one of the primary effects of an earthquake where displacement or fissuring occurs along the fault zone and may produce differential movement and/or subsidence. The Alquist-Priolo Earthquake Fault Zoning Act was enacted to mitigate the hazard of surface fault rupture along active faults in California (References 25 and 73). The extent of damage due to surface rupture is thought to occur along active portions of fault zones. However, the effectiveness of evaluating this earthquake impact varies depending upon the site geology and fault motion. For example, some faults or fault zones will move or rupture in connection with seismic activity and rupture on other nearby faults. This type of fault rupture is termed sympathetic movement, and is thought to correspond with possible fault rupture within the Crafton Hills horst and graben fault complex (Reference 54). At least two faults in the Planning Area have been deemed to be active by criteria established by

the CDMG. Several other faults, as depicted on MEA Figure 4.6, should be considered active, or at a minimum potentially active, based on information or studies available to date. Accordingly, the potential for surface rupture or sympathetic movement from active faults is considered to be high in the Planning Area. Differential movement or fissuring from fault rupture can damage structures and displace roadways, aqueducts, pipelines and other buried utilities in the Planning Area.

**Ground Shaking and Acceleration.** The extent of ground shaking associated with an earthquake is dependent upon the size of the earthquake and the geological material of the underlying area. The size of an earthquake has traditionally been reported as Richter magnitude (M) defined in terms of the maximum amplitude of seismic motion recorded on a Wood-Anderson seismometer at a distance of 100 km from the source (Reference 31). The moment magnitude (Mw) scale is used for large earthquakes greater than M6, as the Richter magnitude scale underestimates the energy released during large magnitude earthquakes. The moment magnitude scale is based on the area of fault rupture, the average amount of slip, and the shear modulus of the rocks offset during the earthquake (Reference 26). The Richter and moment magnitude scales are logarithmic. Therefore, the shaking resulting from a M7.5 earthquake is five times greater than a M7 earthquake. In the same manner, the shaking resulting from a M7.5 earthquake is 100 times greater than a M5.5.

The Modified Mercalli Intensity Scale, as depicted in MEA Table 4.2, is designed to quantify damage caused during an earthquake. Generally, the highest amount of damage occurs closest to the epicenter. However, the 1985 Mexico City earthquake and the 1989 Loma Prieta earth-quakes, showed that a high degree of human loss and structural damage can occur many miles away from the epicenter depending upon the geologic material of an area. The Landers M7.5 earthquake on June 28, 1992, was located approximately 44 miles from the Redlands Planning Area. The greatest amount of damage during this earthquake was at a Modified Mercalli scale of VIII and IX closest to the epicenter. The city of Redlands experienced damage classified at a Modified Mercalli scale of VI (References 72 and 73).

One of the methods of measuring ground shaking during an earthquake is by measuring acceleration in terms of gravity (g). Hypothetical horizontal ground acceleration values can be calculated or estimated using a variety of charts or attenuation curves for various faults, rock type and distance from the earthquake epicenter. Hypothetical vertical ground acceleration values are generally thought to be less than horizontal acceleration values, and thus not typically calculated or estimated for design purposes. Based on published attenuation curves or charts (References 7, 9, 33 and 62), maximum or peak horizontal ground accelerations for a maximum credible earthquake on the San Andreas fault system of M8.3 are anticipated to exceed 1.0g. Maximum horizontal ground accelerations for a 100-year maximum probable earthquake on the San Andreas fault system of M7.5 are anticipated to vary between 0.7 and 1.0g within the Planning Area. Bedrock or peak ground acceleration values for a maximum credible (M7.1) or 100 year probable (M7.0) earthquakes on the San Jacinto fault zone near the Planning Area are some what less. However, due to the proximity of the Planning Area to the San Andreas fault zone and its higher 100 year probable magnitude earthquake event, the San Andreas fault should be considered the causative fault for design and planning purposes.

In general, it is expected that ground acceleration values decrease with greater distance from the epicenter. However, the Northridge earthquake of M6.7 indicated that the dip of the fault plane and the vertical upward motion, termed directivity, was the greatest controlling factor in the amount of ground shaking (Reference 61). Also, soft soils may have also produced larger ground motions locally (Reference 61).

The Northridge horizonal accelerations at free-field stations yielded values ranging from 0.32g at 24 miles from the epicenter to 2.3g eleven miles from the epicenter (Reference 19). In addition to horizontal ground accelerations, the recent Northridge earthquake has yielded data on vertical acceleration values recorded throughout the Los Angeles area. The Northridge earthquake vertical acceleration values at free-field stations yielded values of 0.13g at 24 miles from the epicenter to 1.7g eleven miles from the epicenter (Reference 19).

**Table 4.2**
**Modified Mercalli Intensity Scale**

| | | | |
|---|---|---|---|
| I | No felt by people, except rarely under especially favorable circumstances | VII | Difficult to stand. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary buildings; considerable in badly designed or poorly built buildings. Noticed by drivers of automobiles. Hanging objects quiver. Furniture broken. Weak chimneys broken. Damage to masonry; fall of plaster, loose bricks, stones, tiles, and unbraced parapets. Small slides and caving in along sand or gravel banks. Large bells ring. |
| II | Felt indoors only by persons at rest, especially on upper floors. Some hanging objects may swing. | VIII | People frightened. Damage slight in specially designed structures; considerable in ordinary substantial buildings, partial collapse, great in poorly built structures. Steering of automobiles affected. Damage or partial collapse to some masonry and stucco. Failure of some chimneys, factory stacks, monuments, towers, elevated tanks. Frame houses moved on foundations if not bolted down; loose panel walls thrown out. Decayed pilings broken off. Branches broken from trees. Changes in flow or temperature of springs and wells. Cracks in wet ground and on steep slopes. |
| III | Felt indoors by several. Hanging objects may swing slightly. Vibration like passing of light trucks. Duration estimated. May not be recognized as an earthquake. | IX | General panic. Damage considerable in specially designed structure; great in substantial buildings, with some collapse. General damage to foundations; frame structures, if not bolted, shifted off foundations and thrown out of plumb. Serious damage to reservoirs. Underground pipes broken. Conspicuous cracks in ground; liquefaction. |
| IV | Felt indoors by many, outdoors by few. Hanging objects swing. Vibration like passing of heavy trucks; sensation of jolt like a heavy ball striking the walls. Standing automobiles rock. Windows, dishes, doors rattle. Wooden walls and frame may creak. | X | Most masonry and frame structures destroyed with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Landslides on river banks and steep slopes considerable. Water splashed onto banks of canals, rivers, lakes. Sand and mud shifted horizontally on beaches and fault land. Rails bent slightly. |
| V | Felt indoors and outdoors by nearly everyone; direction estimated. Sleepers wakened. Liquids disturbed, some spilled. Small unstable object displaced or upset; some dishes and glassware broken. Doors swing; shutters, pictures move. Pendulum clocks stop, start, change rate. Swaying of tall trees and poles sometimes noticed. | XI | Few, if any masonry structures remain standing. Bridges destroyed. Broad fissures in ground; earth slumps and landslides widespread. Underground pipelines completely out of service. Rails bent greatly. |
| VI | Felt by all. Damage slight. Many frightened and run outdoors. Persons walk unsteadily. Windows, dishes, glassware broken. Knickknacks and books fall off shelves; pictures off walls. Furniture moved or overturned. Weak plaster and masonry cracked. | XII | Damage nearly total. Waves seen on ground surfaces. Large rock masses displaced. Line of sight and level distorted. Objects thrown upward into the air. |

Source: USGS, Geological Survey Circular 1045, 1990.

During the Landers (Mw 7.3) and Big Bear earthquakes (Mw 6.2) the majority of the stations recording horizontal ground acceleration values were located at a distance of greater than 20 km (13 miles) from the epicenter. One station recorded a ground acceleration value of approximately 0.8g. Horizontal acceleration values close to the epicenter during these earthquakes were sparse. These acceleration values were compared to available attenuation relationships developed by research scientists (References 8, 34 and 62). The mean ground acceleration values for both the Landers and Big Bear shocks were almost twice the calculated mean values estimated from the above attenuation curves (Reference 13). These data suggest that higher ground acceleration values may be expected during earthquakes than previously calculated from attenuation curves.

In summary, recently recorded horizontal and vertical accelerations generated from the Landers, Big Bear, and blind thrust Northridge earthquakes were very high. These recent values, when compared to the current Building Code design values and bedrock ground motion values estimated for the 100-year probable earthquake on the closest segment of the San Andreas fault in the Planning Area, appear to indicate planning and design concerns.

Accordingly, the potential for significant ground shaking from local or distant earthquakes is considered to be high in the Planning Area. Ground accelerations, both horizontal and vertical may exceed anticipated or calculated values at various distances from the fault epicenter as well as the current maximum Uniform Building Code design value (0.4g). Ground shaking from horizontal and vertical ground accelerations during an earthquake can cause structural damage or collapse of improvements to rock and soil failures within steeply inclined roadway cut slopes.

#### 4.2.3.2 Secondary Effects Of Seismic Hazards

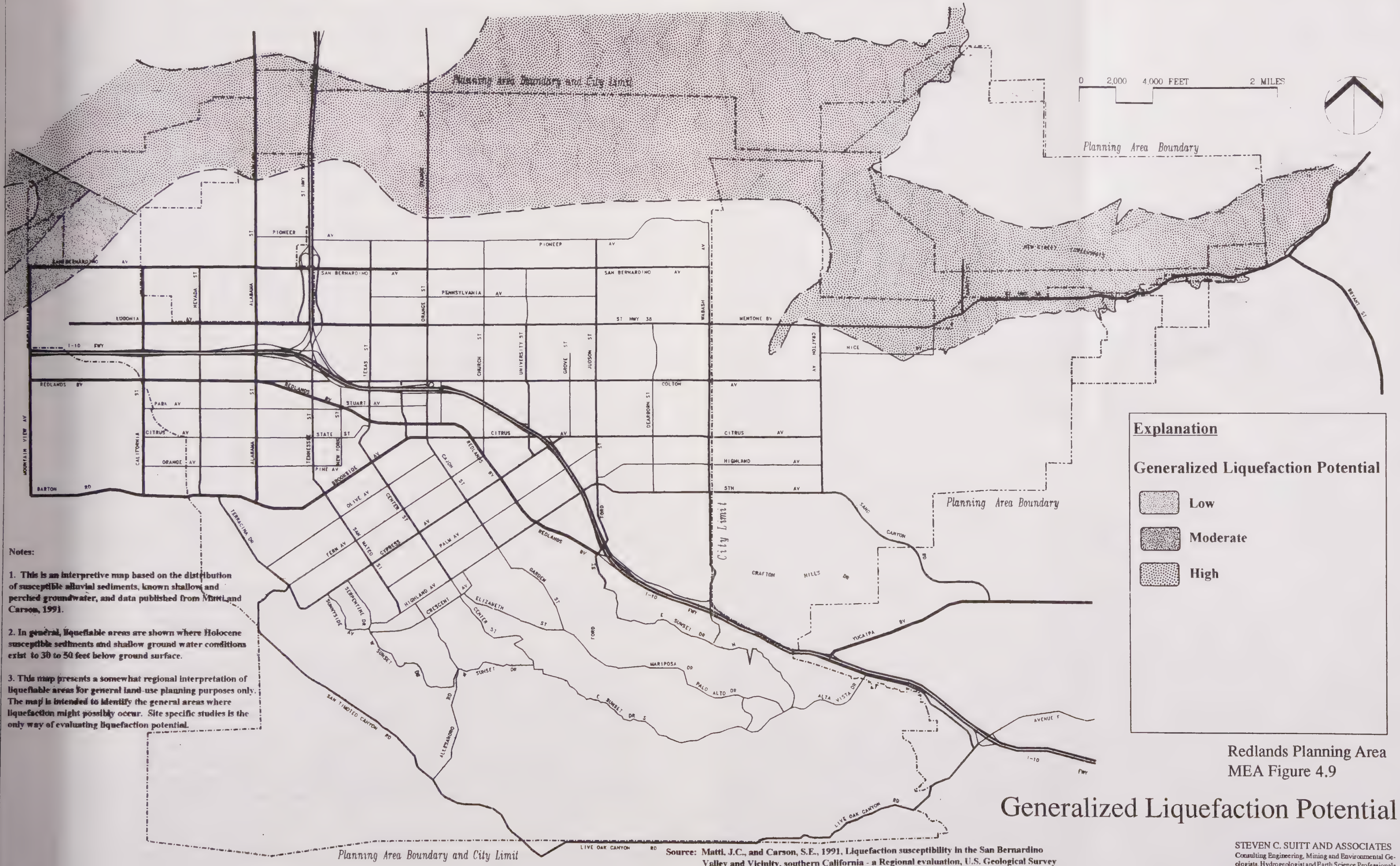
Secondary seismic hazards, such as those associated with severe ground shaking during an earthquake include: liquefaction, earthquake induced flooding, seiches, tsunami and landsliding. For purpose of clarity, induced seismicity is included in this section. Each is addressed below.

- **Liquefaction**hazards include large areas of ground settlement, local differential settlement and lateral spreading. A study of liquefaction potential has been performed by the USGS in the Redlands Planning Area (References 48 and 49). The results of these studies are depicted on MEA Figure 4.9, Generalized Liquefaction Potential.

  Liquefaction is defined as the transformation of a granular soil from a solid to a liquid state as a consequence of increased pore-water pressure that occurs during seismic shaking. Soils that are temporarily liquefied during earthquakes loose shear strength and their ability to support loads or overlying weight. This can result in differential settlement, lateral spreading or even building collapse. It is possible to evaluate the relative potential for an area to undergo liquefaction. Loose, cohesionless fine sands and silty sands that commonly comprise recent sediments are more prone to liquefaction than older and, hence, more consolidated sediments. Thus, relative liquefaction potential is generally interpreted as a function of the age of sediments and depth to ground water. Those areas with high liquefaction potential will generally have young alluvial deposits and shallow (less than 25-40 feet deep) groundwater.

  **Lateral Spreading.** Because of the recency of alluvial deposits and the usually high groundwater levels associated with the presence of any creek channel, areas along waterways tend to have the highest potential for lateral-spreading (lurching) type liquefaction hazards.

This condition generally occurs as a result of movement of soil toward a free space, such as creek channels along San Timoteo, Reservoir and Live Oak Canyon.




Notes:

1. This is an interpretive map based on the distribution of susceptible alluvial sediments, known shallow and perched groundwater, and data published from Matti and Carson, 1991.

2. In general, liquefiable areas are shown where Holocene susceptible sediments and shallow ground water conditions exist to 30 to 50 feet below ground surface.

3. This map presents a somewhat regional interpretation of liquefiable areas for general land-use planning purposes only. The map is intended to identify the general areas where liquefaction might possibly occur. Site specific studies is the only way of evaluating liquefaction potential.

**Explanation**

**Generalized Liquefaction Potential**

- **Low**
- **Moderate**
- **High**

Redlands Planning Area
MEA Figure 4.9

# Generalized Liquefaction Potential

**Source:** Matti, J.C., and Carson, S.E., 1991, Liquefaction susceptibility in the San Bernardino Valley and Vicinity, southern California - a Regional evaluation, U.S. Geological Survey Bulletin 1898, 40p., plates.

STEVEN C. SUITT AND ASSOCIATES
Consulting Engineering, Mining and Environmental Geologists, Hydrogeologist and Earth Science Professionals

**Seismic Settlement.** During very large earthquakes, it is possible for subsidence or seismically induced settlement to occur in loose granular soils in the flat or gently sloped portions of the Planning Area as a result of intense ground shaking. Seismic induced settlement may total many feet. Differential settlement is a form of seismic induced settlement and occurs along areas where the depth to bedrock varies abruptly, such as along the edges of alluvial basins north and west of Crafton Hills and north of the San Timoteo Badlands. According to the San Bernardino County General Plan FEIR, existing data is insufficient to identify areas of significant seismically induced settlement potential in the San Bernardino Valley, although it is anticipated that such areas would be expected to correspond within the areas of shallow ground water, or areas of high liquefaction potential.

According to the USGS, a generalized analysis of relative liquefaction potential of the Upper Santa Ana River Basin shows that most of the northern Planning Area is not susceptible to liquefaction hazard due to the great depth to ground water. An exception however, is the entire corridor north of the Crafton Hills along the Mill Creek Zanja, which has been categorized as having high liquefaction potential.

- Earthquake Induced Flooding. Earthquake induced flooding can occur with dam, levee or aqueduct failures, and with seiches and tsunamis.

  **Dam, Levee, Pipeline or Aqueduct failure.** The Army Corps of Engineers has concluded that the Seven Oaks Dam would perform satisfactorily if subjected to an earthquake of Richter magnitude 8+, which it believes to be the maximum credible earthquake magnitude for the region. Should the dam fail for this or any other reason, however, a dam inundation area has been identified, and is shown on MEA Figure 6.3, Dam Inundation Areas. Inundation from failure of the Bear Valley Dam and reservoir, although considered an unlikely event, has been mapped by San Bernardino County, and is shown on MEA Figure 6.3.

The Redlands aqueduct and pipeline is located in the vicinity of the San Andreas and Greenspot faults. Intense ground shaking or surface rupture in the vicinity of the above improvements could create a local flooding hazard. Accordingly, the potential for inundation from levee, pipeline or aqueduct failure is considered moderate to high in the northeast portion of the Planning Area.

- Seiche. A seiche is an oscillation of a water body in an enclosed or semi-enclosed basin (as are reservoirs behind dams), which can last from a few minutes to a few hours, with a height variation from a few inches to a few feet. A seiche may result from earthquakes or other causes (such as a landslide). The occurrence of a seiche on the Seven Oaks Dam reservoir in the event of an earthquake would likely be noticed by those in the vicinity, but would not be expected to affect the Planning Area.

- **Tsunami.** Earthquake induced ocean waves (tsunamis) generally occur as a result of surface rupture from thrust or normal faults and seldom reach heights of 100 feet. Due to the Planning Areas great distance from the ocean, the potential for flooding due to tsunamis is considered to be remote.

- Seismically Induced Slope Instability. Rockfalls and landslides are types of slope instability that can occur as a direct result of earthquake shaking. This type of slope instability is most likely to occur in areas mapped by the USGS and CDMG (Reference 71) as having landslide potential. As noted in MEA Section 4.1.3.2 above, a generalized analysis of relative slope stability by the USGS (References 47, 50, 51, 52 and 53) and County of San Bernardino geologist (Reference 58) has identified a high to moderate landslide potential in almost every hillside within the Redlands Planning Area. Landslides and rockfalls can occur in these hillside areas during a strong earthquake. Ground shaking can also cause slope failures in areas with over steepened road cutslopes and building pad cutslopes with fractured or loose

rock. Additionally, landslides during earthquakes are more likely in the wet season, and in areas of high ground water or saturated surficial soils. Landslides or rockfalls occurring around the Seven Oaks Dam could lead to additional impacts by causing water waves.

- Induced Seismicity. A new classification of earthquake, known as induced seismicity, refers to earthquakes occurring as a result of human activity. Studies in the last 15 years have documented earthquakes occurring in the vicinity of a reservoir which has been refilled after a seasonal low period. In Northern California, the Cleveland Hill fault earthquake of 1975 (Richter magnitude 5.7) occurred following an unprecedented drawdown and subsequent refilling of Lake Oroville. A CDMG study notes that this sequence suggest possible triggering by the large fluctuation in Lake Oroville storage.

  Construction of the dam closest to the Redlands Planning Area -- Seven Oaks Dam -- is currently in progress. The environmental documents prepared by the Army Corps of Engineers do not consider the possibility of induced seismicity. The best planning response to this potential hazard is ongoing monitoring of studies of induced seismicity.

### 4.2.4 Earthquake Preparedness

#### 4.2.4.1 Earthquake Preparedness

The Redlands Fire Department maintains an Emergency Plan which describes responsibilities in the event of several types of disasters, including earthquakes. (See MEA Section 15.7, Emergency Management and EIR 16.7, Emergency Management.) Prior to the emergency, however, there are preventive measures which may be taken to minimize or mitigate impact. Part of the strategy for earthquake preparedness requires taking action in parts of the Planning Area which are already developed, and the other part involves restricting or limiting development in still-undeveloped hazardous areas.

**Areas already developed.** For areas which are already developed, retrofitting buildings may be a necessity. The first step is to identify buildings which may need reinforcement, and a logical place to start is with unreinforced masonry buildings. Unreinforced masonry buildings have little resistance to earthquake shaking. In small earthquakes their brittleness can lead to cracks, and in stronger shaking they generally collapse.

Within Redlands a building survey done in April 1991 yielded a list of 80 unreinforced masonry buildings. Most of these buildings are clustered around the downtown area, and about 15 percent of them have recognized historic value.

Other types of construction are more resistant to earthquakes. Although susceptible to fires, wood-frame buildings tend to behave in a ductile manner during shaking. Structural steel buildings are the most ductile; during an earthquake they may deform, but they generally withstand collapse.

**Undeveloped areas.** Restrictions or limitations, as identified in an engineering geologic and geotechnical investigation, on development in potential constraint areas is the best type of earthquake preparedness. Taking into account proximity to active and potentially active faults, slope, landslide potential, liquefaction potential location in relation to flood zones, transmission lines, pipelines, aqueducts, levees, and access are all considerations which lead to sound earthquake planning.

## REFERENCES


1. Aki, K., Henyey, T.L., Andrews, J., 1995, Seismic hazards in southern California: Probable Earthquakes, 1994-2024, Southern California Earthquake Center, Phase II Report, to be published in Bulletin of Seismological Society of America April.

2. Animoto; P.Y., 1981, Erosion and sediment control handbook, California Departmet of Conservation, Division of Mines and Geology.

3. Bortugno, E.J., and Spittler, T.E., 1986, Geologic map of the San Bernardino Quadrangle, Map no. 3A, California Division of Mines and Geology, 1:250,000.

4. Brady, N.C., 1974, The nature and properties of soils, Macmillan Publishing Co., Inc., New York, New York.

5. Brown, A.R., and Ruff, R.W., eds., 1981, Geology of the San Jacinto Mountains, Annual Field Trip Guidebook No. 9, South Coast Geological Society.

6. Buol, S.W., Hole, F.D., and McCracken, R.J., 1973, Soil Genesis and Classification. The Iowa State University Press, Ames, Iowa.

7. Campbell, K.W., 1989, Empirical prediction of near-source ground motion for the Diablo Canyon Power Plant site, San Luis Obispo County, California: U.S. Geological Survey, Open-file Report 89-484, 115 p.

8. Campbell, K.W., 1994, Strong ground motion attenuation relationships, handouts, Association of Engineering Geologists, Short course on Seismic Hazard Analysis, June 18, Los Angeles, California

9. Campbell, K.W. and Bozorgnia, Y., 1994, Near-source attenuation of peak horizontal acceleration from worldwide accelerograms recorded from 1957 to 1993, in Fifth U.S. National Conference on Earthquake Engineering, July 10-14, Chicago, Illinois, p. 283-292.

10. Campbell, K.W., and Bozorgnia, Y., 1994, Empirical Analysis of strong ground motion from the 1992 Landers, California, Earthquake, Bulletin of the Seismological Society of America, V. 84, no. 3, pp. 573-588

11. Corona, F.V., Sabins, F.F., Jr., and Frost, E.G., 1993, The San Andreas Fault System, Identification of Wrench-Fault Assembledges and their associated Hydrocarbon Traps using Remoste Sensing Data, Ninth Thematic Conference on Geologic Remot Sensing, Pasadena, California, Field Trip Guidebook.

12. Cox, B.F., and Morton, D.M., 1978, Generalized map of surficial materials in northwestern Riverside and southwestern San Bernardino Counties, California, U.S. Geological Survey Open File Report, OF 78-978.

13. Cramer, C.H., and Darragh, R.B., 1994, Peak accelerations from the 1992 Landers and Big Bear, California, Earthquakes, Bulletin of the Seismological Society of America, v. 84, no. 3, pp. 589-595.

14. Davis, J.F., Bennett, J.H., Borchardt, G., Khale, J.E., Rice, S.J., and Silva, M.A., 1982, Earthquake planning scenario for a magnitude 8.3 earthquake on the San Andreas Fault in southern California: California Department of Conservation, Division of Mines and Geology, Special Publication 60, 128 p.

15. Dibblee, T.W., 1982, Geology of the San Bernardino Mountains, southern California, in Fife, D.L., and Minch, J.A., eds., Geology and mineral wealth of the California Transverse Ranges, South Coast Geological Society, Annual Symposium and Guidebook Number 10, p. 149-169.

16. Dibblee, T.W., 1978, Regional Geologic map of San Andreas and related faults in Eastern San Gabriel Mountains, San Bernardino Mountains, western San Jacinto Mountains and vicinities, Los Angeles, San Bernardino and Riverside Counties, California, U.S. Geological Survey, Open File Map 71-88, 1:250,000.

17. Dibblee, T.W., 1968, Geologic map of the Redlands Quadrangle, California. U.S. Geological Survey, Open File Report 74-1022, 1:24,000.

18. Dutcher, L.C., and Burhnam, W.L., 1960, Geology and groundwater hydrology of the Redlands-Beaumont area, California, with special reference to groundwater outflow: U.S. Geological Survey Open File Report, 352 p.

19. ENR, 1994, Phantom thrust fault shakes up geologists, January 31, p. 16.

20. Environmental Protection Agency, Office of Wastewater Enforcement, 1992, Stormwater pollution prevention for industrial activities, Draft.

21. Federal Highway Administration, U.S. Department of Transportation, 1986, Guidelines for slope maintenance and slide restoration, Report no. FHWA-TS-85-231.

22. Fife, D.L., and others, 1976, Geologic Hazards in Southwestern San Bernardino County, California, CDMG Special Report 113.

23. Gary S. Rasmussan and Associates, Inc., 1977, Engineering Geology Investigation, 45$\pm$ Acre Parcel, southwest corner of Tenth and "D" streets, Yucaipa, California, pn. 1237.

24. Hardin, J.W., and Matti, J.C., 1989, Holocene and Late Pleistocene slip rates on the San Andreas Fault in Yucaipa, California, using displaced alluvial fan deposits and soil chronology, Geological Societyof America Bulletin, v. 101, p. 1107-1117.

25. Hart, E.W., 1994, Fault-Rupture Hazard Zones in California, Alquist Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zones maps, Department of Conservation, California Division of Mines and Geology, Special Publication 42.

26. Hauksson, E., Jones, L.M., Hutton, K., and Eberhart-Phillips, D., 1993, The 1992 Landers Earthquake sequence: seismological observations, Journal of geophysical Research, v. 98, no. B11, p. 19,835-19,858, Nov. 10.

27. Hauksson, E., 1992, Seismicity, faults, and earthquake potential in Los Angeles, southern California, in Bernard W. Pipkin and Richard J. Proctor, eds., Engineering Geology practice in southern California, Association of Engineering Geologists, southern California section, special publication no. 4, Star Publishing Company, Belmont, California, p. 167-179.

28. Hollingsworth, R., and Kovacs, G.S., 1981, Soil Slumps and Debris Flows: Prediction and protection, Bulletin of the Association of Engineering Geologists, v. XVIII, no. 1, p. 17-28.

29. Hope, R.A., 1969, Map showing recently active breaks along the San Andreas and related faults between Cajon Pass and Salton Sea, California, U.S. Geological Survey Open File Report 69-130, 1:24,000, 2 sheets.

30. Johnson, B., 1979, Factors that influence the stability of slopes - a literature review, U.S. Geological Survey Technical Report, prepared for the U.S.Department of Transportation, Federal Highway Administration, Report No. FHWA-RD-79-54.

31. Johnson, J.A., Campbell, K.W., and Blake, T.F., 1994, Seismic hazard analysis, Association of Engineering Geologists, southern California section, short course, June 18.

32. Jones, L., 1986, Focal mechanisms and the state of stress on the San Andreas Fault in southern California, Journal of Geophysical Research, v.93, no. B8, p. 8869-8891.

33. Joyner, W.B. and Boore, D.M., 1981, Peak horizontal acceleration and velocity from strong-motion records including records from the 1979 Imperial Valley, California, earthquake: Bulletin of the Seismology Society of America, v. 71, p. 2011-2038.

34. Joyner, W.B. and Boore, D.M., 1988, Measurement, characterization, and prediction of strong groung motion in Proc. of Earthquake Engineering and Soil Dynamics, II GT Div./ASCE, Park City, Utah, 27-30 June 1988, 1-60

35. Kanamori, H., 1977, The energy release in great Earthquakes, Journal of Geophysical Research, v. 82, no. 20, p. 2981-2987.

36. Kupferman, S., 1995, Verbal Communication, Riverside County Geologist.

37. Leighton and Associates, Inc., 1990, Seismic Safety Element of the Los Angeles County General Plan, Department of Regional Planning, adopted December 6.

38. Leighton, F.B., 1968, Landslides and hillside development, in Leighton, F.B., and Proctor, eds., Geology and Urban Development.

39. Li, Y.G., Vidale, J.E., Aki, K., Marone, C.H., and Lee, W.H.K., 1994, Fine structure of the Landers Fault Zone: segmentation and rupture process, Science, v. 265, 15 July, p. 367-370.

40. Lofgren, B.E., 1976, Land subsidence and aquifer-system compaction in the San Jacinto Valley, Riverside County, California - a progress report, U.S. Geological Survey Journal of Research, v. 4, no. 1, p. 9-18.

41. Lofgren, B.E., 1971, Estimated subsidence in the Chino-Riverside and Bunker Hill-Yucaipa areas in southern California for a postulated water-level lowering, 1965-2015, U.S. Geological Survey Open File Report.

42. Magistrale, H. and Sanders, C., 1994, Evidence from precise earthquake hypocenters for segmentation of theSan Andreas Fault in San Gorgonio Pass, submited to Journal of Geophysical Research, September 7.

43. Matti, J.C., 1995, Verbal Communication, USGS.

44. Matti, J.C., and Morton, D.M., 1993, Paleogeographic evolution of the San Andreas fault in southern California: A reconstruction based on a new cross-fault correlation, in Powell, R.E., Weldon, R.J., II, and Matti, J.C., eds., The San Andreas Fault System: Displacement, Palinspastic Reconstruction, and Geologic Evolution: Boulder, Colorado, Geological Society of America Memoir 178, p. 107-159.

45. Matti, J.C., Brown, H.J., Miller, F.K., Wrucke, C.T., Calzia, J.P., Conway, C.M., 1993, Preliminary geologic map of the North-Central San Bernardino Mountains, California, U.S. Geological Survey Open File Report, OF 93-544.

46. Matti, J.C., Morton, D.M., and Cox, B.F., 1992a, The San Andreas Fault System in the vicinity of the central Transverse Ranges Province, southern California, U.S. Geological Survey Open File Report, OF 92-354.

47. Matti, J.C., Morton, D.M., Cox, B.F., Carson, S.E., and Yetter, T.J., 1992, Geologic setting of the Yucaipa Quadrangle, San Bernardino and Riverside Counties, California, U.S. Geological Survey Open File Report, OF 92-446.

48. Matti, J.C., and Carson, S.E., 1991, Liquefaction susceptibility in the San Bernardino Valley and vicinity, southern California - a regional evaluation, U.S. Geological Survey Bulletin 1898, 40 p., plates.

49. Matti, J.C., and Carson, S.E., 1986, Liquefaction susceptibility in the San Bernardino Valley and vicinity, southern California: a preliminary evaluation, U.S. Geological Survey Open File Report OF86-562.

50. Morton, D.M., 1978, Geologic map of the Redlands Quadrangle, San Bernardino and Riverside Counties, California, U.S. Geological Survey Open File Report 78-21, 1:24,000.

51. Morton, D.M., 1976, Geologic Hazards in Southwestern San Bernardino County, California, Geologic, Fault, and Major Landslide and Slope Stability Maps, in CDMG Special Report 113.

52. Morton, D.M., 1978, Geologic map of the Sunnymead Quadrangle, Riverside County, California, U.S. Geological Survey Open File Report 78-22, 1:24,000.

53. Morton, D.M., 1990, Geologic map of the Yucaipa Quadrangle, California, U.S. Geological Survey Open File Report , 1:24,000.

54. Morton, D.M., 1995, Verbal Communication, USGS.

55. Morton, D.M., Matti, J.C., 1993, Extension and contraction within an evolving divergent strike-slip fault complex: The San Andreas and San Jacinto fault zones at their convergence in southern California, in Powell, R.E., Weldon, R.J., II, and Matti, J.C., eds., The San Andreas Fault System: Displacement, Palinspastic Reconstruction and Geologic Evolution: Boulder, Colorado, Geological Society of America Memoir 178.

56. Petersen, M.D., and Wesnousky, S.G., 1994, Fault slip rates and earthquake histories for active faults in southern California, Bulletin of the Seismological Society of America, v. 84, pp. 1608-1649.

57. Preliminary Fault Activity Map of California, 1992, California Department of Conservation, Division of Minjes and Geology, DMG Open File Report 92-03, 1:750,000 and Appendix.

58. Reeder, W., 1995, Verbal Communication, San Bernardino County Geologist.

59. San Bernardino County Official Land Use Plan, 1989 General Plan, Geologic Hazard Overlay, Redlands, FH31D, 1:24,000.

60. San Bernardino County Official Land Use Plan, 1989 General Plan, Geologic Hazard Overlay, Yucaipa, FH32D, 1:24,000.

61. Scientists of the U.S. Geological Survey and the Southern California Earthquake Center, 1994, The

magnitude 6.7 Northridge, California, Earthquake of 17 January 1994, Science, v. 266, p. 389-397, 21 October.

62. Seed, H.B. and Idriss, I.M., 1982, Ground motions and soil liquefaction during earthquakes: Earthquake Engineering Research Institute, Monograph, no. 5, 134 p.

63. Sharp, R.V., Rymer, M.J., Morton, D.M., 1986, Trace-fractures on the Banning fault created in association with the 1986 North Palm Springs earthquake, Bulletin of the Seismological Society of America, v. 76, no. 6, pp. 1838-1843.

64. Sieh, K., and others, 1993, Near-field investigations of the Landers earthquake sequence, April to July 1992, Science, v. 260, 9 April, p. 171-176.

65. Special Studies Zones, 1977, Redlands Quadrangle, Revised official map, California Division of Mines and Geology, 1:24,000.

66. Special Studies Zones, 1979, Yucaipa Quadrangle, Revised official map, California Division of Mines and Geology, 1:24,000.

67. Steven C.Suitt and Associates, Inc. 1992, Feasibility-level Geological Investigation, 45 Acres East Highland Parcel, San Bernardino County, Calikfornia, Consultants Report PN 1CL105A, February 29.

68. Stout, M.L., 1976, Geologic guide to the San Bernardino Mountains, southern California, Guidebook of Annual Spring Field Trip, Association of Engineering Geologists, southern California Section Publication, 115 p.

69. Structural Engineers Association of California, Seismology Committee, 1988, Recommended Lateral Force Requirements and Commentary.

70. Guidebook T309, 28th International Geological Congress.

71. Toppozada, T.R., 1993, The Landers-Big Bear earthquake sequence and its felt effects, California Geology, January/February, p. 3-16.

72. Tan, Siang, 1990, Landslide Hazards in the Yucaipa and Forest Falls Quadrangles, San Bernardino County Landslide Hazard Identification Map No. 18, CDMG Open File Report 90-5.

73. Toppozada, T.R., Borchardt, G., and Hallstrom, C.L., 1993, Planning scenario for a major earthquake on the San Jacinto fault in the San Bernardino area, California Department of Conservation, Division of Mines and Geology, Special Publication 102, 208 p.

74. Toppozada, T.R., and Wilson, R.I., 1992, April 22 Joshua Tree, and June 28 Landers and Big Bear earthquakes, 1992, California Geology, July/August, p. 118-120.

75. U.S. Department of Agriculture, Soil Conservation Service, 1977, San Bernardino County, southwestern part, Redlands Quadrangle, California, sheet no. 9, 1:24,000.

76. Treiman, J., 1995, Verbal Communication, CDMG.

77. U.S. Department of Agriculture, Soil Conservation Service, 1980, Soil Survey of San Bernardino County, southwestern Part, California.

78. U.S.Department of Agriculture, Soil Conservation Service, 1977, San Bernardino County, Southwestern

part, Yucaipa Quadrangle, California, sheet no. 10, 1:24,000.

79. Wesnousky, S.G., 1986, Earthquakes, Quaternary faults, and Seismic Hazards in California: Journal of Geophysical Research, v. 91, no. B12, p. 587-613.

80. Wesnousky, S.G., Prentice, C.S., and Sieh, K.E., 1991, An offset Holocene stream channel and the rate of slip along the northern reach of the San Jacinto fault zone, San Bernardino Valley, California, Geolocial Society of America Bulletin, v. 103, p.700-709, May.

81. Zeiser Geotechnical, Inc., 1993, Geotechnical Study Incorporating Subsurface Investi-gation for E.I.R. Preparation, 215-Acre Hidden River Country Club Specific Plan, San Timoteo Canyon Area, City of Redlands, California, Consultants Report dated August 30, PN 92239-00.

82. Ziony, J.I., 1985, Evaluating Earthquake Hazards in the Los Angeles Region - An Earth Science Perspective, USGS Professional Paper 1360.

# 5.0 AGRICULTURAL LANDS

Redlands General Plan / MEA

# 5.0 AGRICULTURAL LANDS

**Summary Extract.** Agriculture, mainly citrus, occupies 20 percent of the Planning Area. Citrus provided the original economic base for Redlands and remains a viable crop. Like virtually all agriculture, it is difficult for citrus to compete for space against urban uses. Redlands' oranges are of exceptional quality, relatively low-cost irrigation water is available, and there is less frost danger than at most other citrus-producing areas in California. Citrus preservation is widely supported in Redlands, although most growers are wary of measures that would limit their ability to eventually convert their land to urban use. Issues addressed during the General Plan revision process were the amount and location of agricultural land to be preserved and the means of preservation purchase, regulation, incentives, or a combination of the three.

## ECONOMICS OF CITRUS FARMING

Despite a two-thirds decline in acreage during the last 30 years, 4,888 acres (16 percent of the Planning Area) are still in citrus. Other agriculture (row crops, livestock, and Christmas tree farms) account for 918 acres. With relatively low-cost water, good productivity, no severe cold, and a large percent of the fruit commanding premium prices for export to Asia, the industry became stable during the 1980s. At 1988 prices, gross income is \$3,500 to \$6,000 per acre in good years -- attractive to an owner who paid \$12,000 or less for the land or to an owner who is holding for subdivision, but not justified as a return on investment if an alternative is sale to a developer for \$30,000 to \$70,000 per acre.

Even at its present reduced scale, the citrus industry is a significant contributor to Redlands' economy. The \$6 to \$10 million annual crop value is income that circulates within the community and may directly and indirectly account for as many as 5 to 10 percent of local jobs. However, displacement of citrus by urban development would not represent a net loss to the local economy. Homes can be sold only if jobs are available within commute distance. For each acre of citrus displaced by residential development, the number of new jobs created would have to be about 10 times the number of citrus industry jobs lost. Two acres of citrus support less than one job, while seven homes that might replace the citrus will not be built and occupied unless 10 jobs are available.

## EXISTING AGRICULTURAL PRESERVES

Each of the Planning Area's five concentrations of citrus is mainly within an Agricultural Preserve a boundary originally designated in 1970 within which landowners may enter 10-year (Williamson Act) contracts to maintain open use in exchange for taxation based on agricultural use rather than market value. Lands in Agricultural Preserves are shown in MEA Figure 5.1. Contracts renew automatically each year unless the owner or the public entity (City or County) serves notice of nonrenewal, in which case the contract will be terminated at the end of the nonrenewal period, 10 years hence. Once the contract is terminated the land would become available for development if all other factors are consistent.

To be eligible for a Williamson contract, land must be within an Agricultural Preserve designated by a city or county. As of May 1995, the City had 177 acres under contract; similar data for San Bernardino County would require a search of Assessor's records. No 1995 data regarding the number or acreage of contracts that are being allowed to expire has been collected, but notices of nonrenewal are numerous within the City.

The Planning Area contains over 6,700 acres of land classified by the State Important Farmlands Inventory as Prime, of Statewide Importance, or Unique. Citrus is the major crop in each of these categories.

**Crafton.** Generally the area southeast of Fifth Avenue, Wabash Avenue, and Colton Avenue in both the City and the County is the warmest and most productive of the five citrus areas. County zoning requires 5- and 10-acre minimum sites, and there is a market for home sites at this density. Sites as small as 2.5 acres are permitted in a portion of the City Preserve. The Williamson Act contracts were initiated at dates scattered

According to the November 1993 County of San Bernardino Geologic Hazard Overlay, most of the Redlands Planning Area is considered to have a low potential for slope instability due to its low relief. In general, portions of the Planning Area, such as the base of the San Bernardino Mountains, high elevation portions of the Crafton Hills, and the Badlands are considered to have moderate to high slope instability potential. Existing slope instability in the above steeper Planning Areas is generally manifested by surficial soil slips, mud/debris flows, soil creep within expansive clayey soils, and rockfall on moderately steep slopes and within natural drainages (tributaries). A majority of the Crafton Hills, northeastern Planning Area, and the hills northerly of the Badlands have low to moderate landslide potential.

Large bedrock landslides have been mapped by the USGS (References 50, 51, 52 and 53), CDMG (Reference 71) and geotechnical consultants in the Crafton Hills, south San Timoteo Badlands and in the steeper slopes of the northeast Planning Area. Additionally, the areas surrounding these existing landslides have moderately steep relief and are classified as having a moderate to high slope instability potential. Existing landslides and slope instability potential are depicted on MEA Figure 4.4, Landslide Potential. This figure should be used for general planning purpose only, and is not intended to preclude the need for site-specific study.

Slope instability potential can also be related to seismic activity, especially in areas with moderately steep to steep slopes and oversteepend road cuts. Seismically induced landslides and rockfalls are described in MEA Section 4.2.2.2, Seismicity of Southern California.

### 4.1.3.3 Subsidence

Subsidence, the sinking or downward settling of the earth's surface, has become apparent in many parts of California over the last 50 years. The principal cause has been the removal of large volumes of subsurface fluids, such as groundwater or petroleum hydrocarbons. (See Section 6.3 for further discussion of groundwater withdrawal). Despite efforts to recharge aquifers, subsidence often occurs during years of heavy groundwater withdrawal. The entire southwestern San Bernardino County has experienced subsidence from groundwater withdrawal through 1961, with possible subsidence ranging from 0.3 to 5.8 feet (Reference 41).

According to the USGS (Reference 54), subsidence from groundwater withdrawal has occurred in the Yucaipa Graben and in the Loma Linda community, east and west of the Planning Area, respectively. Effects ranged from cracks or fissures which formed on the surface to visible settling relative to adjacent areas. The same phenomena may be occurring within the Redlands Planning Area, but has not yet been identified. Based on the information available to date, and the presence of moderately shallow groundwater, the potential for subsidence due to groundwater withdrawal should be considered as moderate to high in the northwest portion of the Planning Area.

Subsidence can also be related to seismic activity, as such, impacts are described in the MEA Section 4.2.3.2, Secondary Effects of Seismic Hazards.

### 4.1.3.4 Expansive Soils

Expansive soils are those possessing a shrink-swell potential or a potential for change in volume with changes in moisture content. They generally consist of clays, silty to sandy clay and clayey sand. Extent of shrinking and swelling is influenced by the amount and kind of clay in the soil. Shrinking and swelling of soils causes much damage to building foundations, roads, and other structures. Those clayey soils within the Redlands Planning Area that are generally categorized by the Soil Conservation Service as having low to moderate expansion potential include: Ramona, Saugus and to a lesser extent the San Timoteo series (Reference 73). These soils generally have a high clay content or a well developed argillic horizon that is characterized as slightly sticky and slightly plastic to plastic. According to the Soil Conservation Service the

expansive soils generally occur in the gentle to moderately steep slopes of the Planning Areas valley floor, fans, terraces and hillsides within the San Timoteo Badlands. MEA Figure 4.5, Expansion Potential depicts those soils that have low to moderate expansion potential.

#### 4.1.3.5 Compressible/Collapsible Soils

Compressible or collapsible soils are those which decrease in volume with an increase in overlying weight or water. This condition results in settlement of the ground surface. Soils susceptible to a decrease in volume generally occur in surficial deposits in the low lying or gently sloped portions of the Planning Area. Surficial soils of alluvial valleys, stream bottoms and the base of slopes in the northwestern half of the Planning Area, as well as Reservoir, Live Oak and San Timoteo Canyon and Mill Creek areas, should be considered as having a moderate to high potential for collapse.

#### 4.1.3.6 Percolation Potential/Effluent Disposal

Those hillside sections of the Planning Area where on-site sewage effluent disposal is necessary for development may create impacts to down stream water quality and initiate or contribute to slope instability. Most soil types within the Planning area are of sufficient thickness to preclude effluent from being introduced directly into fractured rock or to daylight to the ground surface. The Cieneba-Friant soils in the Crafton Hills portion of the Planning Area are generally characterized as having sandy loams overlying shallow bedrock. These soils are considered to have a high to moderate impact to slope instability and groundwater quality from effluent disposal.

#### 4.1.3.7 Rippability

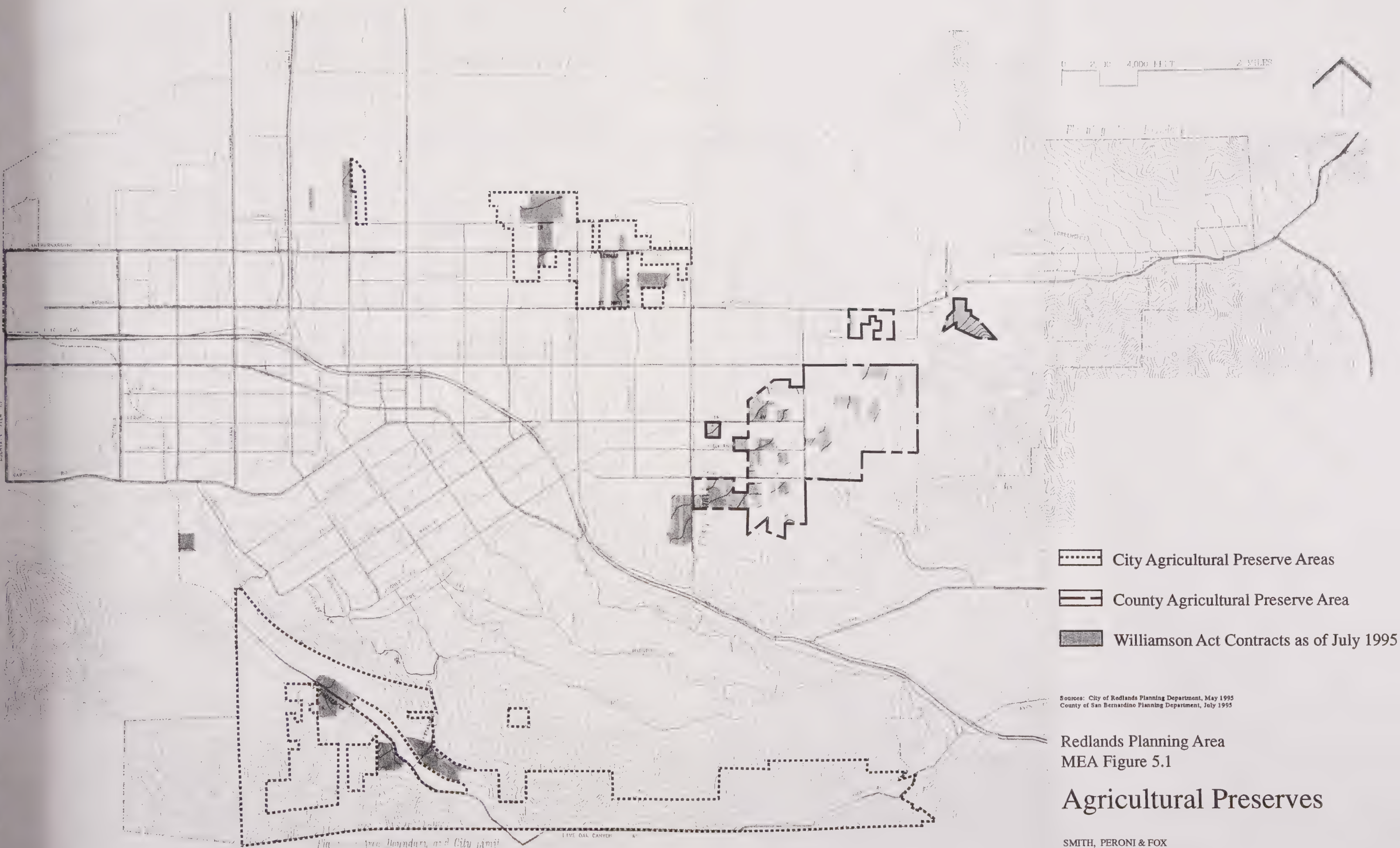
The potential for difficult rippability (excavatibility) exist in those hillside portions of the Planning Area composed of Pelona Schist and the San Gabriel and Wilson Creek Block gneisses and granites. These rock units generally outcrop in the northeastern Planning Area and the Crafton Hills. Difficult, or impossible rippability of these rock units could necessitate the use of blasting. Blasting can adversely affect portions of the Planning Area with noise and dust impacts. Blasting can adversely affect vegetation and exiting improvements. Considering the fractured condition of most of the hard rock units within the Redlands vicinity, there is a low potential for difficult rippability in the Crafton Hills and northeastern hillside portion of the Planning Area.

## 4.2 Faulting and Seismicity

### 4.2.1 Regional Faulting and Seismic Setting

**Introduction.** The Redlands Planning Area is situated within the highly seismically active southern California region. Based on it's tectonic setting, southern California is located on the boundary of two lithospheric plates: the Pacific plate and the North American plate. Movement along these two plate boundaries causes earthquakes or seismicity primarily when the northwest motion of the Pacific plate slides past the North American plate in what is termed right-lateral transform strike-slip motion. The surface expression or boundary between these two plates is evident by the northwest trending system of faults known as the San Andreas fault system, which includes the Planning Areas' northerly and southerly bounding San Andreas and San Jancinto fault zones.

**Setting.** The present San Andreas system is, in part controlled by earlier faulting episodes, but today represents the only seismically active fault system in the Redlands Planning Area. The seismic and tectonic setting of the Planning Area has evolved through at least three previous episodes of faulting and rock deformation. A unifying theme to focus on is the different ages and types of faults that are prominent players in the history of this region. Each of the major episodes of faulting is discussed briefly below with final




Redlands Planning Area
MEA Figure 5.1

# Agricultural Preserves

SMITH, PERONI & FOX
BLAYNEY, DYETT, GREENBERG
ESRI

between 1970 and 1995. Citrus occupies 975 acres. There is significant support in Crafton for citrus preservation, although this could be eroded by approval of mass grading for large subdivisions in the Crafton Hills or adjoining the east side of Wabash Avenue.

**Mentone.** This Planning Sector has about 1,216 acres of citrus, some of which is newly planted. Only four Agricultural Preserve parcels are under contract (1988).

**North Redlands.** Both soils and trees are the poorest in this Planning Sector, but Redlands Municipal Airport constrains residential development opportunities. Citrus occupies 765 acres in this Planning Sector. Nearly all of these groves are in an Agricultural Preserve.

**Northwest Redlands.** The Agricultural Preserve, which includes 1,020 acres in the County and 370 acres in the City, was disestablished with adoption of the *East Valley Corridor Specific Plan*. Even without the industrial development proposed by the *Specific Plan*, the case for citrus preservation would be weaker than in Crafton. Although the area has good groves and large ownerships, it is subject to cold weather and has no identity as a rural living environment except two homes occupied by grove owners. The Environmental Impact Report for the *Specific Plan* reported the estimated value of 1986 citrus production at $5 million or $3,100 per acre.

**West Redlands**. There are about 15 scattered parcels within the *East Valley Corridor Specific Plan* area which total 141 acres of citrus.

**San Timoteo Canyon**. An Agricultural Preserve extends from just south of Barton Road through San Timoteo and Live Oak canyons to Interstate 10. San Timoteo Canyon includes 345.63 acres of citrus. Citrus yields are good, although the area is vulnerable to cold weather.

**FUTURE PRESERVATION**

The Draft General Plan proposes to preserve approximately 500 acres of citrus in agricultural lands of Prime Agricultural Land, Unique Agricultural Land, and Agricultural Lands of Statewide Importance. Agricultural lands including citrus, within the Planning Area are shown on MEA Figure 5.2, Agricultural Lands.

- AGRICULTURAL LANDS, Sources of Further Information:
  - California Department of Conservation, Farmland Mapping and Monitoring Program, 1988.
  - *Redlands 2000 Citrus Forum Report,* December 1987


Redlands Planning Area
MEA Figure 5.2

# Agricultural Lands

SMITH, PERONI & FOX
BLAYNEY, DYETT, GREENBERG
ESRI

# 6.0 HYDROLOGY

Redlands General Plan / MEA

# 6.0 HYDROLOGY

**Summary Extract.** Water issues continue to be a critical regional issue, and Redlands has its share of concerns over drainage, flooding, water supply and conservation, and water quality. Human modifications to the natural Santa Ana River-related drainage system have generally provided flood protection for Redlands, although localized flooding occurs. The long-term imported State Water Project water supply is uncertain, due to a combination of political and environmental variables over which the City has little control. Local groundwater is seriously contaminated in some portions of the Planning Area.

## Related Environmental Evaluations

Within the Planning Area numerous development proposals, see MEA Figure 1.1, Index to Environmental Documents, have been analyzed and reviewed in terms of their overall impact upon the City of Redlands. The environmental analysis conducted for all of these projects also detailed impacts and mitigation measures necessary to reduce hydrological impacts of the development proposals identified in MEA Figure 1.1 propose acceptable levels of mitigation that are consistent with the policies identified in the General Plan Hydrology Section and current (1995) planning efforts being undertaken by the Army Corps of Engineers (ACOE), the San Bernardino County Flood Control District and the City of Redlands Public Works Department.

The proposed Hidden River Country Club Estates project lies in San Timoteo Canyon north and contiguous to San Timoteo Creek and northwest of Alessandro Boulevard. This project proposes to realign and channelize San Timoteo Creek within the site boundary. In contrast to the design parameters as proposed by the Hidden River Country Club Estates project the Department of the Army, Corps of Engineers (ACOE) is proposing the construction of a series of in-channel debris basins on the western half of the proposed Hidden River Country Club Estates project.

## 6.1 Drainage

The Santa Ana River and its tributaries drain the southern portions of the eastern San Gabriel Mountains and the southern region of the San Bernardino Mountains. From headwaters near Big Bear Lake in the San Bernardino Mountains, the flows descend into the San Bernardino Valley and recharge the largest underground water basin in the region, the Upper Santa Ana River Basin. The Redlands area belongs to the Santa Ana River watershed, and all flows within the Planning Area eventually lead to the Santa Ana River. Bunker Hill is the ground water basin underlying the Planning Area which is part of the Santa Ana River watershed region.

Surface and groundwaters in the Upper Santa Ana River Basin flow through Prado Dam, at the head of the Santa Ana River Canyon, then into Orange County where waters are diverted for recharge of the Orange County groundwater basin. From there, stormwater flows may reach the Pacific Ocean.

The Santa Ana River traverses the northern edge of the Redlands Planning Area. From the upper Santa Ana Canyon, the River hits a natural floodplain and becomes a broadened wash, up to two miles wide. This sandy wash is punctuated by numerous stream channels, many of which are dry for most of the year, and several percolation basins. The main channel of the River is located along the southern edge of the wash and flows are generally confined to a narrow channel within the riverbed. From the upper Santa Ana Canyon mouth to Prado Reservoir, the channel is alternately natural and improved as it passes through various undeveloped and developed areas. In addition to this significant feature, three other important drainageways impact the Planning Area, flowing generally east to west.

Merging with the Santa Ana River in the northeast corner of the Planning Area north of Mentone is the Mill Creek channel. The Mill Creek drainage area comprises about 52 square miles, with an average slope within the Redlands area of approximately four percent. The flows of this natural-bottom channel are confined by levees where Mill Creek turns to the northwest and broadens to join the Santa Ana River.

The Mission Zanja Creek (known locally and in various reaches as the "Sankee," the Mill Creek Zanja, the Zanja/Mill Creek channels, and the Mission Zanja) splinters to the southwest of Mill Creek's main channel north of the Crafton Hills, and flows through the heart of the City, joining with the drainage of the Morey Arroyo at New Jersey Street and Citrus Avenue. The Mission Zanja Creek watershed extends to the crest of the Crafton Hills, and thus accepts all of the runoff from these hills. The Zanja becomes the Mission Zanja just before leaving the Planning Area in the west. After this journey above and below ground, through both natural-bottom and culvertized channels, the Mission Zanja finally joins the Santa Ana River west of Tippecanoe Avenue in San Bernardino. Native Americans carved and deepened the Zanja channel in the 1600s, and it is now recognized as an historic feature. The City of Redlands is planning restoration of portions of the Zanja, tying in the bulk of the flows to an underground storm channel, with a designed surface flow along the right-of-way as a feature of a regional linear park. This watershed will be referred to as the "Mission Zanja Creek" throughout the MEA/EIR and General Plan documents.

Yucaipa Creek drains Live Oak Canyon in the southeast corner of the Planning Area. Where Live Oak Canyon meets San Timoteo Canyon, the flows join, and continue their journey together towards the Santa Ana River. Like other watersheds in the Upper Santa Ana River Basin, the 126-square-mile watershed of San Timoteo Creek is steep, with an average slope ranging from about five to 15 percent and in some areas slopes that exceed 30%. After leaving the confines of San Timoteo Canyon, the channel broadens to a wash, joining the Santa Ana River west of the Planning Area, in Loma Linda. San Timoteo Creek is partially improved and runs in a narrow channel for a 5-mile reach through Loma Linda, before its confluence with the Santa Ana River.

Issues pertaining to the Mission Zanja/Morey Arroyo drainage (including an inventory of existing facilities and the lack of capacity to handle the 100-year flood) were analyzed in the 1988 Draft Engineers' Report of the *East Valley Corridor Facilities Specific Plan,* prepared by Metcalf and Eddy. Discussion in that report was based on peak flow assumptions presented in the most recent regional drainage study done on a portion of the Planning Area: the 1986 *Morey Arroyo: Regional Drainage Study*, also prepared by Metcalf and Eddy.

The identified watershed and drainage courses that serve to drain the City and its surrounding environs are included within the San Bernardino County Flood Control District's storm drain planning area No. 4. Comprehensive storm drain plan No. 4 is currently, as of April 1995, being reanalyzed and revised. Boyle Engineering is conducting the study and the expected completion date is October 1996. This Comprehensive Storm Drain Plan will ultimately serve as the City's official Comprehensive Storm Drain Plan.

## 6.2 Flooding

**History and existing conditions.** Flooding within the Santa Ana River Basin has a long recorded history, including catastrophic events that on a few occasions submerged several square miles of the San Bernardino Valley, and significantly altered the course of the Santa Ana River. One account of 1862's flood, known as the area's greatest flood of record, cites billows of water fifty feet high south of Colton, west of the Redlands Planning Area. The disastrous floods of 1938 caused loss of lives and millions of dollars of property damage within the County. Flooding in 1969 led to the declaration of San Bernardino and six neighboring counties as national disaster areas.

Flood improvements such as levees, culverts, and concrete channels and recent planned improvements on the Santa Ana River Mainstem have diminished or are expected to diminish the flood hazard in most problem areas over the next several years, although localized, high-intensity storms are still potential threats to lives and property within the Redlands Planning Area. In 1976, for example, a thunderstorm above the Crafton Hills dropped rainfall

approaching four inches, with 75 to 100 percent of the rainfall occurring within a 30-minute timespan. Flows traveling through the Mission Zanja Creek drainage flooded more than 200 homes and the downtown business area. Water flowing at depths of up to three feet caused an estimated one million dollars in public and private damage in the Redlands area.

Peak flows from San Timoteo Canyon have a recent history of flooding the downstream City of Loma Linda. The natural channel of San Timoteo Creek is inadequate to contain floods greater than a 12-year event magnitude. (See below for discussion of 100-year flood events.) Flows of greater magnitude, containing significant debris including brush, logs, rocks, and mud, tend to break out of the channel at restriction points, due to the buildup of heavy debris, which reduces capacity and causes overflow. When flows break out of the channel, they cause erosion immediately adjacent to the breakout point, and then widespread inundation damage across the floodplain. Damages occur both as a result of short-term inundation and deposition of mud across the floodplain as flows recede. Due to the low population density in the Canyon, San Timoteo Creek flooding has not had a direct physical impact on many residents in the Redlands Planning Area. However, the improvements which are being proposed upstream of Loma Linda will have an impact on San Timoteo Canyon and, depending on design, may affect Live Oak Canyon residents, too.

The flood threat along the Redlands area waterways is compounded by the region's proximity to large wilderness areas and related vulnerability to wildfire, and due to the prevalence of the Santa Ana winds, which can spread fire rapidly. (See MEA Section 15.6, Fire.) After a major fire, sheet flow passing across the face of a denuded landscape is likely to increase in speed and volume, and mud and debris flows combined with flood waters compound the problem.

**Flood Control District.** The San Bernardino County Flood Control District was created in 1939 as a direct aftermath of the floods of 1938. The District, which overlays the entire County covering both incorporated and unincorporated areas, is empowered with broad functions, including flood control and prevention. The authorizing Act which established the District designates the Board of Supervisors of the County of San Bernardino to serve also as the Board of Supervisors of the San Bernardino County Flood Control District, and provides that all County officers shall have corresponding duties and responsibilities for the Flood Control District.

**Planned improvements.** Flood improvements now in the planning or construction phases include the Army Corps of Engineers' Santa Ana River Mainstem project, and the corollary San Timoteo Creek improvements mentioned above. In addition, the Crafton Detention Basin and improvements to the Mission Zanja Creek system are being planned in order to address flooding in the Downtown and University of Redlands areas. Improvements currently anticipated for the Mission Zanja Creek include a detention basin in the Crafton area and a storm drain through downtown. The Mainstem project involves the construction of the Seven Oaks Dam, a 550-foot-high earth-rockfill dam, one mile upstream of the Santa Ana River Canyon mouth, and improvements to the Mill Creek levees, as well as improvements downstream of the Redlands Planning Area. As a part of the Mainstem project the 100-year floodway and floodway fringe, from Seven Oaks Dam, upstream of the Redlands Planning Area, to Prado Dam, downstream of the Planning Area was mapped. MEA Figure 6.4 illustrates that portion of the 100-year floodway that is contiguous to the Planning Area.

To alleviate the downtown flooding problem, the City of Redlands and the San Bernardino County Flood Control District funded a 1986 study which identified the need for a detention basin for temporary storage of Mill Creek Zanja runoff that would occur during a 100-year storm. The basin would reduce the peak outflow in the Mill Creek Zanja channels and even out the flows during a wet period. The current plan for implementing this proposal consists of a single 38-acre basin primarily south of the Zanja, comprising a portion of the area bounded by Opal, Citrus, Colton and Crafton avenues. Construction of the Crafton Detention Basin is not yet funded, and planning details remain to be worked out, but it is expected to be implemented within the horizon of the General Plan.[1]

[1] City of Redlands Public Works Department, January 1991, April, 1995.

The Seven Oaks Dam is located within the San Bernardino National Forest, and will control a drainage area of 177 square miles. The purpose of the Dam is flood control along the Santa Ana River, and it is expected to control a 350-year flood event at the dam site. The planned modifications to the Mill Creek levees are intended to improve the levees so that they provide the level of protection for which they were originally designed, known as the standard project flood overflow, approximately equivalent to the 200-year flood event.

Preliminary design study for San Timoteo Creek resulted in a recommended plan, consisting of upstream in-channel sediment basins draining into a concrete trapezoidal channel, as detailed in the April 1993, Design Memorandum No. 7, Basin for Design for San Timoteo Creek Channel and Sediment - Control Structure. The eight sediment basins, with a maximum basin width of 540 feet, would be excavated approximately along the existing Creek alignment beginning about one quarter mile downstream of Alessandro Road, and extending 1.3 miles. These basins would slow flood flows and trap sediment and debris. Flows would be directed into the upstream-most basin by an excavated inlet structure, and a transition structure from the downstream-most basin would accelerate flows into the improved trapezoidal channel. The channel is expected to be about 5.4 miles long, 30 to 40 feet wide, interrupted by a series of special channel sections at bridges and other constraints. Improvements are expected to lead to a 100-year flood event level of protection downstream of the in-channel sediment basins.

The ACOE, which is serving as the lead agency for the San Timoteo Creek projects has divided the entire system into three reaches or phases. The Corps awarded a contract in September 1994 for Phase I of this project. The construction site of Phase I encompasses 0.7 miles between Interstate 10 downstream to the confluence of the Santa Ana River. In addition, Waterman Avenue bridge in San Bernardino will be replaced in this phase. The design of Phase II has been advertised and scheduled for award in December, 1995.

MEA Figure 6.1, San Timoteo Creek Project, illustrates the 3 reaches or phases and also identifies the San Timoteo Creek project schedule as of February 1995.[2]

In summary, the Final San Timoteo Special Report was completed and distributed in July 1990. The basis for the Design Report was completed in April 1993. The Reach I contract was awarded in September 1994. Reach II and III Plans and Specifications are in progress and are to be completed June 1995 and February 1996, respectively. The required funding for the fiscal year 1995/96 is $5,000,000.00.[3]

MEA Figure 6.2 shows the Mission Zanja Creek (also known as the Mill Creek Zanja east of Redlands Boulevard) and Mission Storm Drain, which was originally built by native American Indians under the direction of Franciscan Padres as a ditch for water supply in 1819. The water diverted from Mill Creek supported the San Bernardino Asistencia and surrounding farms and ranches. The 12-mile-long ditch, which terminates at the Santa Ana River, essentially follows the same course today that the Indians carved out over 170 years ago. As the area has developed and the water supply technology changed, the use of the Zanja has changed from water supply to a flood control and drainage channel.

[2] Ibid.

[3] Ibid.


Redlands Planning Area
MEA Figure 6.1

# San Timoteo Creek Project

Sources: County of San Bernardino Environmental Public Works Agency. Transportation/Flood Control Department

SMITH, PERONI & FOX
BLAYNEY, DYETT, GREENBERG
ESRI

Update, 1995

Redlands Planning Area
MEA Figure 6.2

Mission-Zanja System

Flows in Mission Zanja Creek originate in the Crafton Hills east of Redlands, and traverse westerly through the cities of Redlands, Loma Linda, and San Bernardino to the Santa Ana River. The drainage basin is shaped like a half circle with a length of about 12 miles and an average width of about three miles. The total drainage area is about 25 square miles.

In February 1994, the ACOE completed a reconnaissance study of the Mission Zanja Creek System. The analysis conducted by the Corp was to determine what the most cost effective facilities would be in order to mitigate flooding in the Downtown and University of Redlands areas. This study considered all past work conducted by the Corp and expanded that effort to include the entire upper and lower ends of the drainage area not previously studied. The ACOE determined that two drainage areas, the Crafton Hills area and the Reservoir Canyon area, were most responsible for the inundation episodes in the Downtown and University of Redlands areas. Each drainage area was determined to contribute equally to the flooding episodes. An initial analysis determined that a detention basin in both the Crafton Hills and Reservoir Canyon areas was the preferred mitigation. In addition to alleviating approximately 50% of the contributing flood waters that impact the downtown area, the Crafton Detention Basin is also anticipated to mitigate all of the flooding in the University of Redlands area.[4] It was subsequently determined that the Crafton Hills project did not meet ACOE funding priorities nor could a detention basin site, capable of handling the 100 year storm event, be identified in Reservoir Canyon.

Analysis of downtown drainage conditions without the Crafton Detention Basin identified that an "expanded or modified inlet", approximately 10' x 10' and 1600' long, located between the intersections of 9th Street/Redlands Avenue and the AT&SFRR line/I-10, could mitigate periodic downtown flooding.[5] The City is also discussing other alternatives to address storm waters from Reservoir Canyon including a overflow connection to the proposed storm drain through Downtown. These and other solutions will be studied and mitigations proposed as part of the Comprehensive Storm Drain Plan currently in process.

It is anticipated by the City of Redlands that the ACOE is no longer interested or available to participate in smaller scale projects of the same nature as the facilities deemed necessary in the Downtown and University areas.[6] The City of Redlands and San Bernardino County Flood Control District, however, are still committed to solving the potential flooding problem in the downtown. The City of Redlands and the San Bernardino County Flood Control District have resolved to pursue the original proposal (Crafton Detention Basin) for temporary storage of Mill Creek Zanja runoff that could occur during a 100-year storm, thus reducing the peak outflow in the Mill Creek Zanja channels. The proposal is still being considered by the City and the District, however, construction of the Basin is not yet funded, and planning and design details remain to be discussed between the two agencies. The City of Redlands is currently pursuing monies from the Federal Emergency Management Agency (FEMA) Hazard Mitigation Fund to assist in the financial cost of the project.[7]

In addition, further west of this proposed detention basin, the City of Redlands proposes an underground storm drain by-pass which would divert flows away from portions of the Mill Creek Zanja (See MEA Figure 6.2) One portion of the Mill Creek Zanja (the more easterly reach) is known as a historical site and is registered with the National Register of Historic Places. The second more westerly reach would allow flood waters to bypass the downtown area. The by-pass projects would reduce impacts to the Mill Creek Zanja caused by flood waters as they drain from the east and would control storm flows through the downtown. Engineering design for this project has been completed and all necessary easements have been acquired, however, construction funding is still pending.

[4] Ron Mutter: Public Works Director, City of Redlands.
[5] Ibid.
[6] Ibid.
[7] Ibid.

It is anticipated that the Crafton Detention Basin and the Downtown storm drain bypass will be implemented within the planning horizon of the General Plan. In addition, the Comprehensive Storm Drain Plan currently being prepared by Boyle Engineering will provide definitive answers in determining the optimum flood mitigation facilities and funding sources to address the potential flooding in the Downtown and University of Redlands areas.

**Dam inundation.** The closest existing dam upstream of the Redlands Planning Area is the Bear Valley Dam and reservoir. Drainage from this facility flows into Bear Creek, which in turn joins the Santa Ana River approximately five miles north of Redlands. The Final Environmental Impact Report on the San Bernardino County General Plan reported in 1989 that the Bear Valley flood control dam could pose inundation hazards to portions of the Valley regions. An order was issued requiring that the Dam be shored up or drained, and in 1987 funding was approved by the State legislature for shoring up the dam facility, and by 1989 the work was underway and has since been completed. San Bernardino County General Plan Hazard Overlay maps show the Santa Ana River Wash as flooded in the event of a Bear Valley Dam failure, and the inundation area is reproduced on MEA Figure 6.3, Dam Inundation Areas. The Bear Valley Mutual Water Company and the County Flood Control District acknowledge that such flooding is possible, although they are not actively involved in planning for the possibility.

The Seven Oaks Dam, which is under construction and scheduled for completion in 1998-99, is designed to withstand an earthquake of Richter magnitude 8+, which is deemed realistic for the San Andreas Fault within the foreseeable future. The north branch of the San Andreas Fault is located approximately one-half mile north of the dam site, and the south branch, of the San Andreas Fault is approximately one mile south of the Dam site. Engineering studies performed over the last few years conclude that the Dam could withstand the region's largest anticipated seismic event. In the event of its failure, however, the Army Corps of Engineers has mapped an inundation pathway, which is also shown on MEA Figure 6.3. Flood waters would be projected to flow as far south of the Wash as Pioneer Avenue in North Redlands, and as far north as to inundate Greenspot Road and East Highlands. Disasters other than seismic events leading to the failure of the Dam are not considered in the Corps' environmental documents.

**FEMA flood zones.** The Federal Emergency Management Agency (FEMA) produces maps showing areas subject to 100-year floods. One-hundred-year floods are those floods expected to occur, on the average, once every 100 years, based on historical data. The 100-year flood has a 1/100 or one percent chance of occurring in any given year. Flood insurance rates are based on FEMA's designations of flood zones, and the practice is to avoid or restrict construction within the 100-year flood zones, or to engage in floodproofing techniques, such as elevating buildings, floodwalls, and levees.

Predictably, the corridors of FEMA 100-year flood zones within the Redlands Planning Area correspond to the location of the major drainageways, including the Santa Ana River, the Mission Zanja Creek, and San Timoteo Creek, as shown on MEA Figure 6.4, Flood Zones. The gentle curves which outline most of the zones reflect the natural extent of the floodplain, whereas the abrupt angles indicate that improvements such as levees have interrupted or channeled the flows. Where zones truncate at their downstream end, either flooding is not a problem (due to improvements or percolation) or the area has not been studied.

Planned improvements are expected to alter the extent of areas subject to 100-year floods. Construction of the Seven Oaks Dam and the recently completed (1992) Mill Creek levee improvements are not anticipated to have a significant effect on the southern boundary of the FEMA 100-year flood zone delineation along the Santa Ana River, but will diminish the northern extent of flooding.[8]

[8] City of Redlands Public Works Department, January 1991.


Seven Oaks Dam Inundation Area [2]

Bear Valley Dam Inundation [1]

Sources:

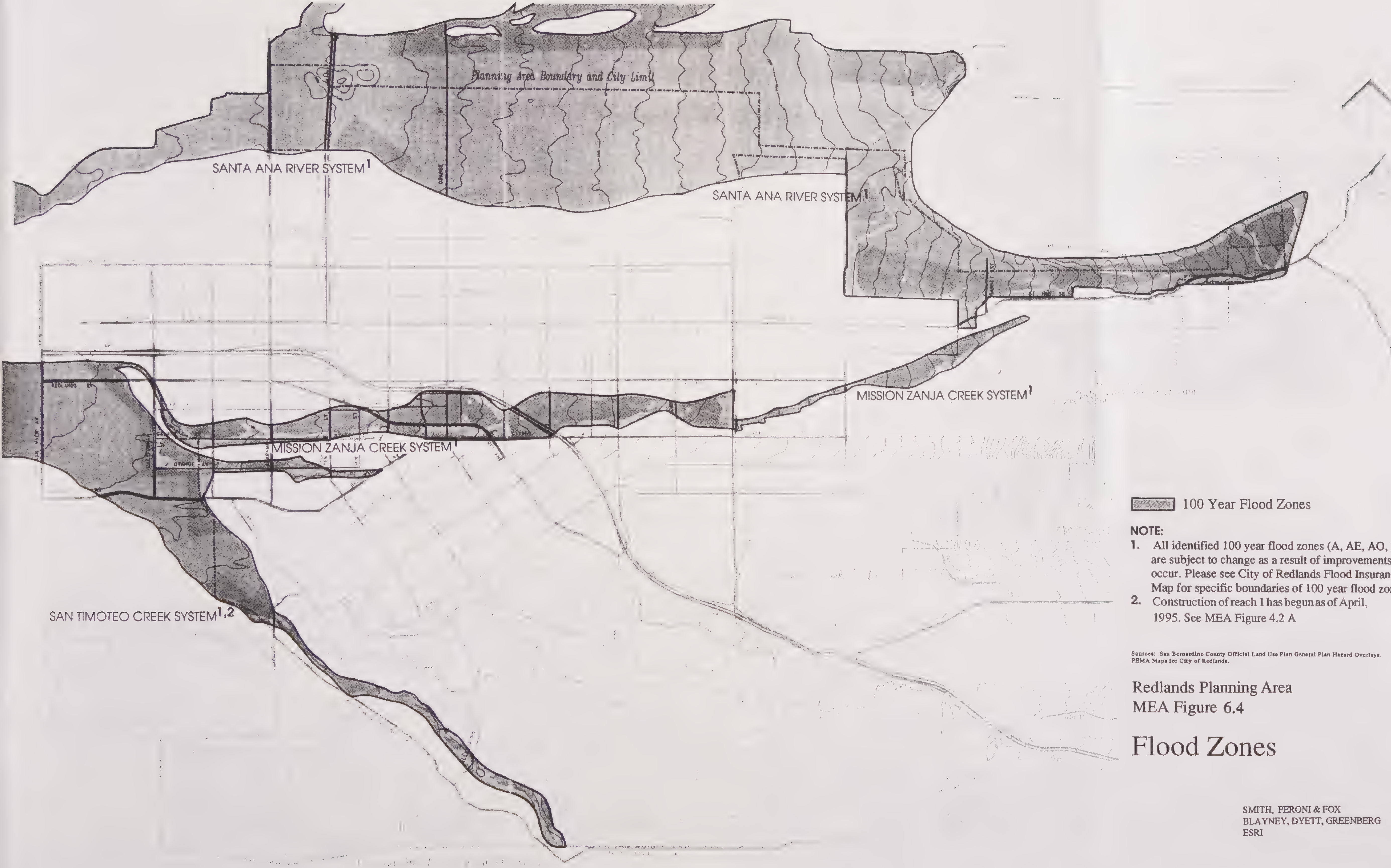
1 San Bernardino County, General Plan Hazard Overlay: PH31 C and PH32 C.

2 Los Angeles District, South Pacific Division, Dept. of the Army, Hydraulic Documentation for Upper Santa Ana River Floodway (Seven Oaks Dam to Prado Dam ), 500-Year, and Seven Oaks Dam Failure Floodplain Delineations, March 1991.

Redlands Planning Area
MEA Figure 6.3

# Dam Inundation Areas

SMITH, PERONI & FOX
BLAYNEY, DYETT, GREENBERG
ESRI
Update, 1995




**NOTE:**

1. All identified 100 year flood zones (A, AE, AO, B, X) are subject to change as a result of improvements as they occur. Please see City of Redlands Flood Insurance Rate Map for specific boundaries of 100 year flood zones
2. Construction of reach 1 has begun as of April, 1995. See MEA Figure 4.2 A

Sources: San Bernardino County Official Land Use Plan General Plan Hazard Overlays. FEMA Maps for City of Redlands.

Redlands Planning Area
MEA Figure 6.4

# Flood Zones

SMITH, PERONI & FOX
BLAYNEY, DYETT, GREENBERG
ESRI

In September 1994, Revised/Preliminary Federal Rate Insurance Maps of the region including the Redlands Planning Area were submitted to the City of Redlands Public Works Department for review and comments. The City has reviewed the Preliminary FEMA Maps and submitted no comments. These new maps are expected to be approved prior to September of 1995. All figures within the MEA/EIR or General Plan which illustrate the 100-year flood bounds do not reflect these Revised/Preliminary FEMA zones. MEA Figure 6.4 illustrates the 100-year flood plane zones as they currently exist (April, 1995).

**Other flooding.** FEMA flood studies focus on inhabited areas when producing maps showing the 100-year flood zones. It is possible that areas currently outside of developed portions of the Planning Area have not been studied in detail, and potential flood hazard areas may thus remain unidentified. Flood Insurance Rate Maps on file at the Community Development Department of the City of Redlands indicate the limits of detailed study.

## 6.3 Water Supply and Conservation

### Water Supply

**Local supplies.** The Redlands Planning Area domestic water sources are comprised of both surface (about 60 percent) and groundwater (about 40 percent). The City is entitled to surface water from both Mill Creek and the Santa Ana River. Mill Creek water is available on the basis of rights owned directly by the City, and by virtue of the City's direct and indirect stock ownership in the Crafton Water Company, which has established rights on the remainder of Mill Creek flows. Mill Creek water is treated at the Henry Tate Water Treatment Plant, located northeast of the City, with a rated capacity of 12 million gallons per day (mgd). Water then flows by gravity from the Tate Treatment Plant to the City's distribution system. The City's entitlement to Santa Ana River flows are by virtue of direct and indirect stock ownership in Bear Valley Mutual Water Company. Santa Ana River water is treated at the Horace Hinckley Water Filtration Plant (HHWFP). The current (1995) capacity of the HHWFP is 12 mgd. The HHWFP was designed to allow for expansion of its current capacity.[9]

The City draws about 40 percent of its water from wells which draw water from the Bunker Hill groundwater basin. The basin contains significant amounts of water to be developed and there are presently no legal or institutional constraints on the amount of water which Redlands can withdraw from the basin. Consequently, new groundwater sources can be developed incrementally to support development as long as the basin itself remains viable. The task of monitoring the status of the Bunker Hill basin lies with the San Bernardino Valley Municipal Water District.

Although the City's potable wells comprise about 40 percent of the water supply, it is estimated that over half of the City's wells are contaminated by agricultural nitrates, and must be considered non-potable, without costly treatment. (See Section 4.4, Water Quality.) Most contaminated wells are located south of the Santa Ana River, where the soil is rocky and porous, and has a rapid infiltration rate. It is anticipated that the contaminant levels will not decrease within the next twenty years, due to the slow percolation through the soil since the time of application of the material. However, non-treated nitrate-contaminated water not suitable for direct human consumption can be used for agricultural irrigation.

The Southeast portions of the City are served by the Western Heights Water Company which derives its water supply from wells. The majority of Western Heights Water Company's service area is within the City limits of Yucaipa. According to the "Annual Water Quality Report" data December 31, 1994, the Western Heights Water Company's water meets or exceeds all Federal and State water quality standards.

---

[9] City of Redlands Municipal Utilities Department, Gary G. Phelps, Municipal Utilities Director, April 1995.

**Imported water.** Imported State Water Project (SWP) water is potentially available to the Planning Area, although this source is more costly than local sources. Historically, Redlands has used imported water only as a short term supplemental source. The San Bernardino Valley Municipal Water District (SBVMWD) is the purveyor of SWP water to the Planning Area. SWP water is transported from the Feather River in Northern California, along the California Aqueduct, to the Aqueduct's East Branch, where it is conveyed eastward to the Planning Area via a 17-mile Foothill Pipeline. The maximum yearly allotment of SWP water from which the Planning Area may draw from the SBVMWD is 102,600 acre feet. The actual amount of SWP water received by the City varies from year to year depending upon the availability of local groundwater supplies and the status of statewide water supply conditions, i.e. is there a drought condition prevailing or are water conditions relatively plentiful.

SBVMWD is the agency responsible for distributing water to member agencies and for groundwater recharge in an area extending from Fontana to Yucaipa. The City of Redlands lies within the SBVMWD, and may purchase SWP water. Redlands has no entitlement to a set amount of water, but may request it in competition with other cities served by SBVMWD. SWP water is treated at the City's Horance Hinckley Water Filtration Plant, which started operation in 1987. The Hinkley Plant has a capacity of 12 mgd, which could be expanded to 24 mgd. The Horance Hinkley Water Filtration Plant is located at the northeast corner of Crafton Street and San Bernardino Avenue.

**Groundwater withdrawal.** The depth to groundwater fluctuates and varies in relation to precipitation and groundwater use and management. The Regional Water Quality Control Board (RWQCB) has noted a gradual drop in groundwater levels in the Redlands area. This trend is a continuation of a region-wide occurrence, which began in the 1800s when the impacts of irrigation and urban demand began to take their toll on local water resources. In contrast to recent years, however, ground water levels in the basin were actually increasing during 1995. Local agencies and water managers have chosen to spread sufficient water (local stream and imported SWP flows) in surface percolation basins, to recharge the groundwater aquifers to accepted levels. The potential unreliability of these surface flows due to drought or political climate leads to the possibility that groundwater levels could again decrease due to lack of recharge sources.

The SBVMWD has expressed a concern over groundwater supplies in San Timoteo Canyon. Although historically supplies seem to have been adequate, groundwater recharge in recent years has been enhanced by flows of treated wastewater discharged from the Yucaipa sewage plant and into Live Oak and San Timoteo canyons. There is some indication that Yucaipa may in the near future engage in a greater water recycling effort. If successful, this effort would be expected to diminish outflows through the canyons, ultimately decreasing recharge of the underground basin, and decreasing the availability of groundwater in San Timoteo Canyon.

## Consumption Rates

According to the most recent update of the City's Water Master Plan, completed in 1984, the Consumption rate for water usage in Redlands is 275 gallons per capita per day (gpcd). Although the City has not updated the 1984 Water Master Plan, the Municipal Utilities Department has reanalyzed the estimated consumption rate for water users in the City and has determined that 300 gpcd is the consumption rate as of 1995.[10] The Municipal Utilities Department has also determined that on average the aggregate daily total of potable water consumed in the Planning Area is approximately 23 millon gallons. Both the 300 gpcd and the average daily aggregate consumption, or total consumption of 23 mg do not include waters utilized for agricultural uses. Water is provided for agricultural use by 15-18 mutual water companies and mutual well companies.[11] Agricultural waters are a combination of non-treated surface waters from Mill Creek and the Santa Ana River and contaminated non-potable private wells.[12] The estimate of waters utilized for agricultural uses is 40,000 acre feet per year.[13]

---

[10] Mike L. Huffstutler, Assistant Utilities Director, City of Redlands: K. Louis Perkins, Engineering Manager, City of Redlands, June, 1995.
[11] Mike L. Huffstutler, Assistant Utilities Director, City of Redlands: K. Louis Perkins, Engineering Manager, City of Redlands, June, 1995.
[12] Ibid.
[13] John Shone, General Manager, Bear Valley Municipal Water District, June 1995.

Utilizing the 1995 figure for average aggregate daily use of water in the Planning Area, of 23 mgd, an estimate of the 1995 yearly consumption for the Planning Area is 25,700 acre feet (65,700 acre feet if waters utilized for agriculture are included).

**Future supplies.** The long-term water supply for the City -- and for the region -- is not secured. An updated City of Redlands *Water Master Plan* will examine the long-term demand for and availability of local ground and surface waters, and SWP supplies. As of May 1995 an update to the City of Redlands Water Master Plan has not been completed. Cumulative development in Southern California has far exceeded the availability of local water supplies, and has increased reliance on imported water. The availability of SWP water over the long-term depends in part on environmental and political variables which are not under the City of Redlands' direct control.

The prudent strategy for Redlands is to minimize reliance on imported water, as specified as a Guiding Policy in the General Plan. Second, if the *Water Master Plan* update shows water supply to be inadequate, development should be curtailed until adequate supplies are secured. Restrictions could be universal, with no new service connections throughout the Planning Area, or restrictions could be area-specific, to prevent major expenditures and discourage growth in yet-unserved areas until new sources can be developed.

### Water Conservation and Reclamation

Another "source" of water supply within the Planning Area is conservation of water and re-use or reclamation of water supplies. Having recently endured a statewide drought, municipalities throughout the region are implementing water conservation programs. In April 1991, the SBVMWD added a requirement for all applicants and customers, including the City of Redlands, to establish and maintain a water conservation program. This program is to provide for the installation and use of low-flow water fixtures, and for the encouragement of use of drought-resistant landscape materials, and efficient landscape watering methods, as described below.

**Conservation.** In May 1991, the City of Redlands passed a Water Conservation Plan, Ordinance No. 2151, which identifies four stages of conservation, with corresponding requirements. Since 1991, no other ordinances equal to a water conservation plan have been adopted by the City. MEA Table 6.1 summarizes the City's Water Conservation Plan. Penalty surcharges for failure to comply are based on a percentage of the customer's water bill, and extreme violations may justify a shutoff of service.

In addition to those conservation measures which focus on facilities improvements (such as retrofitting water fixtures or using leak detection systems), planning for both existing and new landscaping can significantly reduce water use. Native and drought-tolerant plants use less water than exotics, and the watering practices for native and drought tolerant plants are generally more water efficient than those practices employed for turf irrigation. The use of drip-irrigation or other methods which deliver water to or near the root system of the vegetation are efficient techniques of reducing water waste for both landscaped areas and agricultural lands. Delivering water to the root of the plant also cuts down on the growth of weeds.

**Table 6.1**
**City of Redlands Water Conservation Plan**[1]

| Stage | Compliance | Title | Description[2] |
|---|---|---|---|
| I | Voluntary | Conservation Measures | Users requested to limit water use. Recommended actions: reduce or eliminate landscape watering, install water-saving devices, select low-water-demand vegetation for landscaping; restrict restaurant water service. |
| II | Mandatory | Water Alert | Prohibitions on: irrigation; vehicle, structure, pavement, or equipment washing; refilling swimming pools; fountain operation; restaurant water service; failure to control leaks; failure to prevent excess runoff; non-fire fighting use of fire hydrant water. |
| III | Mandatory | Water Warning | Further irrigation prohibitions. |
| IV | Mandatory | Water Emergency | Further prohibitions on: irrigation; washing vehicles and equipment; filling or refilling swimming pools; fountain operation. Issuance of new service connections and meters prohibited. |

[1] Based on Ordinance 2151, adopted May 1991.
[2] All stages are inclusive of measures specified for the prior stage.

Source: City of Redlands Ordinance No. 2151, May 1991.

Another "conservation" measure is the San Bernardino Valley Water Conservation District's practice of removing water from the Santa Ana River and Mill Creek, and transferring it to spreading grounds or percolation basins, where it seeps through the sand and gravel to recharge the aquifer. This practice retains water resources in the area longer than would be the case if surface flows were untapped.

**Reclamation.** The RWQCB recognizes several ways that wastewater is presently being reclaimed in the region. After treatment, wastewater is being returned to the aquifer through percolation and direct discharge to the Santa Ana River. Treated wastewater is also used in the region for irrigation of agricultural land and landscaping, and as industrial process water and cooling water, although the latter use is quite limited. The City of San Bernardino uses treated wastewater for golf course and landscape irrigation, for example. The *Redlands 2000* report stated that the use of reclaimed water for irrigation should be encouraged or required throughout the area. Past debates have centered on issues of cost, since the use of reclaimed wastewater normally requires running additional pipe to each point of delivery, for use in irrigation. The Water Master Plan will need to examine retrofitting the wastewater treatment plant for reclaimed water.

The City of Redlands is planning to incorporate a treated wastewater program very similar to that utilized by the City of San Bernardino. Due to the expense of reclaimed wastewater, it is anticipated that reclaimed wastewater will have limited application, and would be most efficiently utilized by users downstream of the wastewater treatment plant to minimize pumping costs. Capital facilities costs are less important than the long range operational costs, i.e., pumping.

## 6.4 Water Quality

The Regional Water Quality Control Board (RWQCB), which takes direction from the State Water Resources Control Board, is one of nine such boards created to solve California's water quality problems. The guiding document is the *Water Quality Control Plan: Santa Ana River Basin,* 1984, with amendments through 1994. The Plan includes a Basin summary of beneficial water uses, water quality objectives needed to protect the identified beneficial uses, and implementation measures. The RWQCB is a regulatory agency that is concerned with both surface and groundwater water quality.

**Surface water.** Surface flows within the Redlands area are comprised of channelized storm or meltwater flows, wastewater discharges (viewed as "point-source" discharges), and assorted "non-point source" discharges. Non-point source discharges include all of those flows which do not originate at an identifiable location, but become part of the runoff stream.

Surface water quality is protected in part by the City of Redlands Industrial Wastewater Pretreatment Ordinance, which requires water users to remove certain pollutants from wastewater prior to discharging into the public sewer or to the public treatment facility. Without this pretreatment, water quality of surface flows could ultimately be compromised, since the City's wastewater treatment facility is not equipped to handle industrial pollutants.

Surface flows may also become contaminated as a result of contact with polluted agricultural runoff, urban runoff from streets and parking lots, erosion from construction sites, pollutants in freshwater inflow, pollutants from toxic waste sites and landfills, and direct spills of pollutants into a waterway. In addition to becoming part of the surface flow, these non-point source pollutants may be absorbed into the groundwater.

Water quality objectives for each of the surface waterways within the Redlands Planning Area have been specifically established by the RWQCB. To reduce non-point source pollution within San Bernardino County and to comply with EPA's stormwater permit requirements, cities throughout the region are drafting a pre-treatment, best practices management program which specifies strategies for curtailing polluted runoff. Strategies include measures like regular street cleaning, litter pick-up and control (particularly in dry wash areas which are used illegally for dumping, and are later inundated, causing trash to become waterborne), catch basins, hazardous material disposal programs, public education, recycling, and more. Water quality of Mill Creek and of the Santa Ana River in 1979 was excellent. As of 1995 the surface waters of the Redlands Planning Area qualify as "excellent".

**Groundwater.** Groundwater contamination within the Planning Area is more serious than surface water contamination. As a result of wellwater testing, the RWQCB is aware of at least one, large, seriously contaminated portion of the aquifer within the Planning Area, and has been working with the State Department of Health Services (DHS) to address the problem. The area of contamination has been hypothesized by the RWQCB and DHS to originate from an area between north of Madeira Avenue and the levees bounding the southern edge of the Santa Ana River. This toxic plume has been determined to contain high levels of industrial organic solvents (TCE, trichloroethylene) and has been tracked moving from east to west, towards the Santa Ana River. TCE is a compound formerly used as an industrial solvent and heat-transfer medium. It may have come from a variety of sources in the area, including an airport, Lockheed Propulsion Co., a major manufacturing facility, dry cleaning plants, automotive repair shops and machine manufacturing and repair facilities in the northeast section of the City. Groundwater contamination (TCE/DBCP) currently exists, as of 1995, in an area generally bordered by Redlands Boulevard on the south, Pioneer Avenue on the north, Judson Street on the east and Mountain View Avenue on the west.[14]

[14] City of Redlands, Municipal Utilities Department, Gary G. Phelps, Municipal Utilities Director, April 27, 1994.

DBCP (dibromochloropropane), a syrupy toxin added to citrus irrigation water over 30 years ago for treatment of nematodes, is still present in small amounts in the soil and groundwater in portions of the Redlands Planning Area. Testing by the RWQCB has confirmed its presence in an area north of San Bernardino Avenue on either side of State Highway 30. The EPA banned the use of DBCP in 1979. The City has constructed a water treatment system for the City's existing Texas Street well, at the corner of Texas Street and Pennsylvania Avenue. The system is one which has the ability to remove both TCE and DBCP.

High concentrations of nitrates in the groundwater can be toxic. Nitrates within the Planning Area are thought to come from several sources: fertilizer applications, a previously-used sewage treatment facility (abandoned in 1963), and other unknown sources. According to a 1977 USGS Study, there are no indications that nitrate levels will decrease in the near future, even though the application of commercial nitrogen fertilizer, the major source of nitrate, has subsided. The study notes that a considerable time lag, perhaps 40 years or more, may be expected between the fertilizer application and the appearance of nitrates in the groundwater in the Redlands area.[15]

According to the RWQCB, groundwater sampling can be hampered by drought conditions. Drought conditions can considerably lower groundwater table levels. This condition can render some of the shallower testing wells completely dry and therefore inoperable. In addition, drought conditions may trap contaminants in the soil above the lowered water table, in essence removing the contaminants from being in contact with the lower level groundwater table, and thus they do not show up in water sampling. During recent years 1993-1995 normal rainfall conditions have prevailed and the unsaturated soils above the previously lowered water table level have become saturated. Since the normal rainfall conditions have prevailed water sampling has not revealed any areas of new contamination.[16]

The RWQCB notes that groundwater levels in the Redlands Planning Area vary with the amount of rainfall and with recharge operations. Generally stated, at the present time (1995), water levels in the Redlands Planning Area are increasing.[17]

Wells at or near the two landfills and one burn site within the Planning Area -- California Street, Church Street (closed in 1986), and San Timoteo Canyon -- are monitored on an ongoing basis. The RWQCB has ordered Lockheed Propulsion Co. to install and monitor several wells at the California Street site.[18] The Church Street burn site has been historically vulnerable to flooding, given it's position along the southern banks of the Santa Ana River; in 1936 flooding removed all waste in place at the Church Street burn site. It is possible that the 100-year flood event could affect the burn site once again. After closing, landfills will need periodic monitoring to assure their integrity.

---

[15] City of Redlands, 1981 and 1984, *Water Master Plan Update*.

[16] Regional Water Quality Control Board, Region 8, Kamron Sareni, Staff Engineer.

[17] Ibid.

[18] Regional Water Quality Control Board, Region 8, Kamron Sareni, Staff Engineer, May 8, 1995.

Future groundwater quality within the Planning Area is uncertain. It is not known how many more wells will have to be abandoned or converted to agricultural uses during the next fifteen years. Because of the construction of the water treatment plant at Texas Street and successful removal of TCE and DBCP, some wells currently out of service may become available again for domestic use. Well-head treatment of nitrate-contaminated water is also possible, but expensive.

- **HYDROLOGY, SOURCES OF FURTHER INFORMATION:**


  - *City of Redlands, Water Master Plan Update,* 1981, 1984.
  - Department of Health Services, Toxic Substances Control Division
  - FEMA 100-year Flood Maps, (on file with the Community Development Department, City of Redlands)
  - Metcalf and Eddy. *Draft Engineers' Report, East Valley Corridor Facilities Specific Plan*, 1988.
  - Metcalf and Eddy. *Morey Arroyo: Regional Drainage Study, 1986.*
  - Regional Water Quality Control Board. *Water Quality Control Plan, Santa Ana River Basin Plan: 1984 with Amendments to 1989.*
  - *San Bernardino County Background Appendix*, 1989.
  - San Bernardino County Flood Control District
  - *San Bernardino County General Plan FEIR,* 1989.
  - *San Bernardino County General Plan,* 1989 (revised 1993).
  - San Bernardino Valley Municipal Water District
  - U.S. Army Corps of Engineers, *Draft Hydraulic Documentation for Upper Santa Ana River Floodway (Seven Oaks Dam to Prado Dam), 500-year, and Seven Oaks Dam Failure Floodplain Delineations,* March 1991.
  - U.S. Army Corps of Engineers. *San Timoteo Creek Special Report and Technical Appendices,* July 1990.
  - U.S. Army Corps of Engineers. *Santa Ana River: Design Memorandum No. 1, Phase II, GDM on the Santa Ana River Mainstem, including Santiago Creek, various volumes,* 1988.
  - Williamson Schmid. *Mill Creek Zanja Detention Basin Study, Prepared for the City of Redlands and San Bernardino County Flood Control District,* 1986.
  - Source: Patrick J. Mead, Chief, Flood Control Planning Division, Transportation/Flood Control Department, County of San Bernardino, Public Works Group, April 18, 1995.

# 7.0 BIOTIC RESOURCES

Redlands General Plan / MEA

## 7.0 BIOTIC RESOURCES

**Summary Extract.** The following section on Biotic Resources is compiled from various sources including the California Department of Fish and Game (DFG), California Natural Diversity Data Base (CNDDB), other organizations, agencies, and publicly available environmental documents within the Planning Area. These environmental documents, listed in MEA Table 7.3, Documents Containing Species Inventories or Species Discussions Relevant to the Redlands Planning Area, below and shown on MEA Figure 1.1, Index to Environmental Documents, include published lists of species inventories or contain detailed discussions of species within the Planning Area. These documents should be referred to in addition to this section for more specific information on various species of plants and animals.

The Redlands Planning Area is surrounded by past natural communities, and by some of the surviving species characteristic of these habitats. Most of these valued habitats are found along waterways and serve as wildlife corridors. Valued habitats include areas within the Santa Ana River Wash, Mill Creek Wash, the Crafton Hills, San Timoteo Canyon, Live Oak Canyon, and the Badlands (barren land with dry soils and soft rocks eroded into odd shapes). The Zanja (known locally as the "Sankee") and associated drainages are candidates for potential riparian restoration that would increase habitat value. In addition, agricultural fields and the "urban forest" within developed areas provide habitat for some animals.

### 7.1 Regional Setting, Habitat Types, and Corridors

Prior to European settlement in the San Bernardino Valley, the Santa Ana River channel was lined with a leafy border of alders, sycamores, cottonwoods, and willows along an alignment which would now be centered on the Santa Ana Wash. The channel was a dominant landscape feature which contrasted with the Valley floor beyond, comprised of a series of dry, brush-covered areas separated by stretches of moist or swampy land. In general, prior to the introduction of widespread irrigation, which distributed water evenly across the area, the extreme dry areas were dryer and more extensive than they are today, and the extreme wet areas were wetter and more extensive.

The naturally occurring biotic communities within the Planning Area are principally defined by the climate, which is typical of Southern California inland areas. Mild winters, low annual rainfall, and prolonged, dry summers all profoundly influence the vegetative make-up and, consequently, the wildlife supported by it. Since the time of European settlement, the vegetation has been dramatically altered, replaced by urban development and agriculture. Animal populations which have not been extirpated have been generally diminished, and most species have been displaced, suffering a loss of range. Remnants of native vegetation, found primarily in riparian areas, are today interspersed with introduced annual grasses, shrubs, or trees, and agricultural fields, all of which provide some habitat for remaining animals.

The Redlands Planning Area is fortunate in being surrounded by remnants of past natural communities, and by some of the surviving species characteristic of these habitats. Most of these valued habitats are found along waterways and serve as wildlife corridors in addition to habitat for the species which grow or dwell within them. The Santa Ana River Wash and Mill Creek provide habitat and function as wildlife corridors which connect the Wash and Creek habitats with the wildlands of the San Bernardino National Forest to the north.

The Crafton Hills, whose slopes are covered primarily with introduced European species as opposed to natural vegetation, still perform an important role as a physical link between the Santa Ana River-Mill Creek-San Bernardino Mountains habitats and the Live Oak-San Timoteo canyons-Badlands area which frames the southern Planning Area. Wildlife, including larger mammals such as Mule Deer and Mountain Lions, are thought to traverse much of the corridor from the San Bernardino Mountains to the Badlands, a route they can travel in relative isolation from humans.

San Timoteo and Live Oak canyons each contain remnants of past natural communities of regional importance, as described below. The Badlands, while physically peripheral to the Planning Area, is ecologically linked with San Timoteo and Live Oak canyons, sharing some of the same vegetative associations and wildlife. The Badlands and Riverside County's portion of San Timoteo Creek are proposed for inclusion in a reserve as described in Riverside County's *Multiple Species Habitat Conservation Plan*. San Timoteo Canyon Creek reconnects with the Santa Ana River west of the Planning Area, closing the circle which outlines a rough ring of habitat areas and wildlife corridors around the Planning Area.

The Zanja is a waterway which splinters to the southwest of Mill Creek's main channel north of the Crafton Hills, flowing through the heart of Redlands. In different reaches, the stream flows variously above and below ground, in concrete channels and along natural bottomed channels, and possesses varying vegetation, wildlife, and habitat values. The Zanja joins with the Morey Arroyo channel at New Jersey Street and Citrus Avenue. The Morey Arroyo is an unimproved channel which drains the southern portion of the East Valley Corridor Specific Plan. Policies in the General Plan provide for the restoration of the Zanja along part or all of its length to improve its habitat values where it flows above ground. The Morey Arroyo is also considered important for its habitat values and is anticipated to be restored as well. The Zanja joins with other drainages, finally flowing into the Santa Ana River west of the Planning Area. For additional information on drainage, see MEA Section 6.0, Hydrology.

Although a comprehensive biological mapping effort for the Planning Area has not been undertaken, MEA GP Figure 7.1, Biotic Resources (GP Figure 7.2) shows areas of identified valued habitat, wildlife corridors, and potential riparian restoration, as identified by the State Department of Fish and Game (DFG) and local environmental groups. General locations of Rare, Threatened, or Endangered species, and special status species and natural communities are also shown, where information was available. This figure is not intended to serve as a substitute for an on-site biotic resources inventory for specific development projects, but rather as a general reference suggesting the types of species and habitats which may be present.

## 7.2 Special Status Species

Planning Area habitats contain special status species, which are listed in MEA Table 7.1, Rare, Threatened, or Endangered Species and (etc.), and shown on MEA Figure 7.1, Biotic Resources. Certain of these species are recognized as needing special protection under State and Federal law, due to their Rare, Endangered, or Threatened status. These are afforded varying degrees of protection through the applicable laws and regulations of the Federal Endangered Species Act, the California Native Plant Protection Act, the California Endangered Species Act, and the California Environmental Quality Act.

Some not-yet-listed species are under consideration for Federal listing, either as a Category 1 or Category 2. Category 1 species are those candidate species for which the U.S. Fish and Wildlife Service (USFWS) has sufficient biological information to support a proposal for listing the species as Endangered or Threatened. Category 2 species are those candidate species which may warrant listing, but for which substantial biological information to support a proposed listing is lacking; when further information is provided by laboratory or field study, the species may be proposed for listing. The USFWS recommends that impacts on these candidate species be considered during planning projects and environmental review, since they may become listed during implementation of the Plan.

Although they are not protected by law in the same way as are individual species, certain natural communities are also considered to be of special status. They are accorded their special status by the California Natural Diversity Data Base (CNDDB), based on the particular combination of vegetative components which makes them unique. These communities are described below, listed on MEA Table 7.2, Global and State Rankings Identified by the CNDDB within the Planning Area, and general locations are shown on MEA Figure 7.1 (corresponds to GP Figure 7.2).

MEA TABLE 7.1
RARE, THREATENED, OR ENDANGERED SPECIES and SPECIES OF SPECIAL STATUS WITHIN, ADJACENT TO, OR POSSIBLY PRESENT WITHIN THE PLANNING AREA

| Common Name | Latin Name | Status | Location[1] | Source |
|---|---|---|---|---|
| **Natural Communities** | | | | |
| Riversidean Alluvial Fan Sage Scrub | Same | None | Map ID RAFSS | CNDDB |
| Southern Coast Live Oak Riparian Forest | Same | None | Map ID SCLORF | CNDDB |
| Southern Riparian Scrub | Same | None | Map ID SRS | CNDDB |
| Southern Sycamore Alder Riparian Woodland | Same | None | Map ID SSARW | CNDDB |
| Southern Willow Scrub | Same | None | Map ID SWS | CNDDB |
| Canyon Live Oak Ravine Forest | Same | None | Map ID CLORF | CNDDB |
| Southern Riparian Forest | Same | None | Map ID SRF | CNDDB |
| Southern Cottonwood Willow Riparian Forest | Same | None | Map ID | CNDDB |
| **Plants** | | | | |
| Nevin's Barberry | *Mahonia nevinii* | SE, FC1 | Map ID 2; San Timoteo Canyon | CNDDB; TCCL |
| Payson's Jewelflower | *Caulanthus simulans* | FC1 | Map ID G | CNDDB |
| Santa Ana River Wooly Star | *Eriastrum densifolium ssp. sanctorum* | SE, FE | Map ID 3 | CNDDB |
| Slender-horned Spineflower | *Dodecahena leptoceras* | SE, FE | Map ID 4 | CNDDB |
| Parish's Bush Mallow | *Malacothamnus parishit* | FC2 | Map ID J; Santa Ana River Wash | CNDDB |
| Perry's Spineflower | *Chorizanthe parryi var parryi* | FC2 | Map ID K; Locally common | CNDDB |
| **Birds** | | | | |
| Black-shouldered Kite | *Elanus caeruleus* | FPS | Forages in open space and agricultural areas | San Bernardino Valley Audubon Society, CNDDB - Special Animals List, 1994. |
| California Gnatcatcher | *Polioptila californica* | CSC | Map ID A; Santa Ana River Wash; Mill Creek Wash; Live Oak Canyon | DFG; San Bernardino Valley Audubon Society; Friends of Live Oak Canyon |
| Western Yellow Billed Cuckoo | *Coccyzus americanus occidentialis* | SE | Forages in riparian forests | State Dept. of Fish & Game |

MEA TABLE 7.1 (Continued)
RARE, THREATENED, OR ENDANGERED SPECIES and SPECIES OF SPECIAL STATUS WITHIN, ADJACENT TO, OR POSSIBLY PRESENT WITHIN THE PLANNING AREA

| Common Name | Latin Name | Status | Location[1] | Source |
|---|---|---|---|---|
| **Birds (Continued)** | | | | |
| Cooper's Hawk | *Accipiter cooperi* | CSC | Map ID B; Badlands-San Timoteo Canyon area | San Bernardino Valley Audubon Society; *Sunset Hills Deer Management Plan* |
| Ferruginous Hawk | *Buteo regalis* | CSC, FC2 | Forages in open space and agricultural areas | San Bernardino Valley Audubon Society, CNDDB - Special Animals List, 1994. |
| Golden Eagle | *Aquila chrysaetos* | CSC | Map ID C; Santa Ana River Wash | DFG; *Santa Ana River Resource Management Plan Scoping Project* |
| Least Bell's Vireo | *Vereo bellii pusillus* | SE, FE | Map ID 1; Upstream portions of San Timoteo Canyon; Prado Flood Control Basin | State Dept. of Fish & Game |
| Long-eared Owl | *Asio otus* | CSC | Unknown | San Bernardino Valley Audubon Society |
| Loggerhead Shrike | *Lanius ludovicianus* | FC2, CSC | Map ID L; Forages in densely foliaged shrubs or trees | Hidden River Country Club Estates Draft EIR, November 1993 |
| Prairie Falcon | *Falco mexicanus* | CSC | Forages in open space and agricultural areas | San Bernardino Valley Audubon Society |
| Tri-colored Blackbird | *Agelaius tricolor* | CSC, FC2 | Map ID I; Nested in canal between downtown Redlands and California Street | San Bernardino Valley Audubon Society |
| Willow Flycatcher | *Empidonax traillii* | SCE, FCI | Unknown | State Dept. of Fish & Game |
| Yellow-breasted chat | *Icteria virens* | CSC | Unknown | San Bernardino Valley Audubon Society |
| **Mammals** | | | | |
| Los Angeles Pocket Mouse | *Perognathus longimembris brevinasus* | FC2, CSC | Map ID D; Santa Ana River Wash | San Bernardino Valley Audubon Society, CNDDB - Special Animals List, 1994. |
| Merriam's Kangaroo Rat | *Dipodomys merriami* | --[2] | Map ID E; Santa Ana River Wash | San Bernardino Valley Audubon Society, CNDDB - Special Animals List, 1994. |
| Stephen's Kangaroo Rat | *Dipodomys stephensi* | ST, FE | Map ID 5; Reche Canyon; Live Oak Canyon | CNDDB; Friends of Live Oak Canyon State Dept. of Fish & Game |
| **Reptiles** | | | | |
| Orange-throated Whiptail | *Cnemidophorus hyperythrus* | FC2 | Map ID F; Reche Canyon; Upper Santa Ana River Wash; Mill Creek Wash; Badlands-San Timoteo Canyon area | CNDDB; *Santa Ana River Resource Management Plan Scoping Project*; TCCL; *Sunset Hills Deer Management Plan* |

MEA TABLE 7.1 (Continued)
RARE, THREATENED, OR ENDANGERED SPECIES and SPECIES OF SPECIAL STATUS WITHIN, ADJACENT TO, OR POSSIBLY PRESENT WITHIN THE PLANNING AREA

| Common Name | Latin Name | Status | Location[1] | Source |
|---|---|---|---|---|
| **Reptile (Continued)** | | | | |
| San Diego Horned Lizard | *Phyrynosoma coronatum blainvillei* | FC2 | Map ID H; San Timoteo Canyon floodplain; Santa Ana River Wash; Mill Creek Wash; other open space areas | CNDDB; San Bernardino Valley Audubon Society |

[1] Map ID numbers in this table are keyed to GP Figure 7.21-A. Species without Map ID numbers have no known specific location.
Of concern, per San Bernardino Valley Audubon Society.
CNDDB = California Natural Diversity Data Base, Department of Fish and Game
CSC = California DFG Species of Special Concern
DFG = Department of Fish and Game
FC1 = Federal Category 1 Species
FC2 = Federal Category 2 Species
FE = Federal Endangered Species
FT = Federal Threatened Species
FPS = A California Department of Fish and Game "fully protected" species, as described in Section 4700 of Chapter 8, Section 5050 of Chapter 2, Division 6, Chapter 1, Section 5515
FSS = Federal (BLM and USFS) Sensitive Species
SCE = California Candidate for listing as Endangered
SE = State Endangered Species
ST = State Threatened Species
TCCL = Tri-County Conservation League

Sources: CNDDB (1995); Friends of Live Oak Canyon (1995); San Bernardino Valley Audubon Society (1990-1991); Tierra Madre Consultants, Inc., *Sunset Hills Deer Management Plan*, 1990; Tri-County Conservation League (1990); URS Consultants, *Santa Ana River Resource Management Plan: Scoping Project*, April 1988; U.S. Army Corps of Engineers, *Santa Ana River, Design Memorandum No. 1: Phase II GDM on the Santa Ana River Mainstem, Including Santiago Creek*, Volume 8: Environmental, August 1988; State of California, Department of Fish and Game, Special Animals List, August 1994; State of California, Department of Fish and Game, *Annual Report on the Status of California Listed Threatened and Endangered Animals and Plants*, 1992; Chambers Group, Inc., *Hidden River Country Club Estates*, Draft EIR, November, 1993.

RAFSS
SSARW
SRS
SWS
SRF
SCLORF
SANTA ANA WASH
MILL CREEK
ZANJA
SAN TIMOTEO CANYON
LIVE OAK CANYON
MISSION MOREY ARROYO
CRAFTON HILLS
Planning Area Boundary and City Limit
Planning Area Boundary
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
0 2,000 4,000 FEET 2 MILES
Contains Areas of Valued Habitat
Wildlife Corridor
Potential Riparian Restoration
Natural Community*
Rare, Threatened, or Endangered Species*
Species of Special Status (approximate location)*
Species of Special Status (scattered throughout the area)*
NOTE: This figure is keyed to Table 5.2-A. Table 5.2-A lists additional species whose locations are unknown. Locations shown here are approximate, and were not field checked.
SOURCES: California Natural Diversity Database, 1995; Dept. of Fish and Game, 1995; various local individuals and environmental organizations (see MEA/EIR for list of persons contacted); City of Redlands Planning Dept., USGS.
Redlands Planning Area
MEA Figure 7.1
Biotic Resources
SMITH, PERONI & FOX
BLAYNEY, DYETT, GREENBERG
ESRI

In addition to publishing information on these listed species, candidate species, and special status natural communities, the CNDDB independently evaluates their condition. The CNDDB, run by the DFG, is the most complete single source of information on California's sensitive species and natural communities. Data on these and other elements of natural diversity are provided to the Data Base from a number of sources.

The absence of a special plant, animal, or community from the CNDDB does not mean that it is absent from the area in question, only that no occurrence data are currently entered in the inventory. In addition, the occurrence of special species or natural communities in the vicinity of a project may be an indication that they may also occur within the project area. CNDDB biological staff assigns ranks to each special status species inventoried, based on the rarity and taxonomic distinctiveness of the species or community. This is shown on Table 7.2, Global and State Rankings Identified by the CNDDB within the Planning Area.

TABLE 7.2
Global and State Rankings Identified by the CNDDB within the Planning Area

The ranks given are global and state. The Global rank (G-rank) is a reflection of the overall condition of an element throughout its global range. The State rank (S-rank) is assigned much the same way as the global rank, except state ranks in California often also contain a threat designation attached to the S-rank. The following defines both Global and State ranks.

**GLOBAL RANKING**

Species or Natural Community Level
G1 = Less than 6 viable elemental occurrences OR less than 1,000 individuals OR less than 2000 acres.
G2 = 6-20 elemental occurrences OR 1,000-3,000 individuals OR 2,000-10,000 acres.
G3 = 21-100 elemental occurrences OR 3,000-10,000 individuals OR 10,000-50,000 acres.
G4 = Apparently secure; this rank is clearly lower than G3 but factors exist to cause some concern; i.e., there is some threat, or somewhat narrow habitat.
G5 = Population or stand demonstrably secure to ineradicable due to being commonly found in the world.

Subspecies Level

Subspecies receive a T-rank attached to the G-rank. With the subspecies, the G-rank reflects the condition of the entire species, whereas the T-rank reflects the global situation of just the subspecies or variety. For example, *Chorizanthe robusta var. hartwegii* is a plant ranked G2T1. The G-rank refers to the whole species ranges, i.e., *Chorizanthe robusta*. The T-rank refers only to the global condition of *var. hartwegii*.

**STATE RANKING**

S1 = Less than 6 occurrences OR less than 1,000 individuals OR less than 2000 acres.
S1.1 = very threatened
S1.2 = threatened
S1.3 = no current threats known
S2 = 6-20 elemental occurrences OR 1,000-3,000 individuals OR 2,000-10,000 acres.
S2.1 = very threatened
S2.2 = threatened
S2.3 = no current threats known
S3 = 21-100 elemental occurrences OR 3,000-10,000 individuals OR 10,000-50,000 acres.
S3.1 = very threatened
S3.2 = threatened
S3.3 = no current threats known
S4 = Apparently secure; this rank is clearly lower than S3 but factors exist to cause some concern; i.e., there is some threat, or somewhat narrow habitat. NO THREAT RANK.
S5 = Demonstrably secure to ineradicable in California. NO THREAT RANK.

**Notes:**
1. Other consideration used when ranking a species or natural community include the pattern of distribution of the element on the landscape, fragmentation of the population/stands, and historical extent as compared to its modern range. It is important to take a bird's eye or aerial view when ranking sensitive elements rather than simply counting elemental occurrences.

2. Uncertainty about the rank of an element is expressed in two major ways:
   a. By expressing the rank as a range of values. For example, S2S3 means the rank is somewhat between S2 and S3.
   b. By adding a question mark to the rank. For example, S2? represents more certainty than S2S3, but less than S2.
3. Other symbols:
   GH = All sites are historical; the element has not been seen for at least 20 years but suitable habitat still exists (SH = All California sites are historical).
   GX = All sites are extirpated; this element is extinct in the wild (SX = All California sites are extirpated).
   GXC = Extinct in the wild; exists in cultivation.
   G1Q = The element is very rare, but there is a taxonomic question associated with it.

Source: California Natural Diversity Data Base, California Department of Fish and Game, 1995.

## Natural Communities

**Riversidean Alluvial Fan Sage Scrub.** Riversidean Alluvial Fan Sage Scrub is the dominant natural community found within the Santa Ana River Wash and Mill Creek north of Redlands, and provides habitat for a number of species. A small area of Riversidean Alluvial Fan Sage Scrub is also found along Wilson Creek, east of the Planning Area, upstream of Live Oak Canyon. The vegetation associated with this natural community is comprised of various dense shrubs and plants ranging from about one to six feet tall, with scattered grassy openings. Some of the more common shrub and plant species known to be present within the Santa Ana River Wash include Junipers, Yucca, Chemise, and members of the Buckwheat and Sunflower families.

During periods of water stress, plants may become dormant. Alluvial fan soils where Riversidean Alluvial Fan Sage Scrub grows are typically rocky. Although the DFG and USFWS do not specify legal status such as Endangered for individual habitat types, the local Society has identified Riversidean Alluvial Fan Sage Scrub as a severely endangered habitat. The CNDDB ranks this natural community as G1 on a global and S1.1 on a basis.

**Southern Coast Live Oak Riparian Forest.** Occurring primarily in Southern California coastal canyons and valleys, this "forest" is found within the Planning Area in Live Oak Canyon and along Yucaipa Creek between elevations of about 1,680 and 1,800 feet. The predominant species is Coast Live Oak, an evergreen tree with a short, stout trunk, and characteristically large, crooked, spreading branches. The ground between and among the oaks is rich in herbs, and poorer in understory shrubs than other riparian communities. The CNDDB ranks this natural community as G4 on a global and S4 on a statewide basis.

**Southern Riparian Scrub.** This natural community is recognizable as a scrubby streamside thicket dominated by one or more species of willow, as well as by other fast-growing shrubs and vines. One occurrence was mapped in a Santa Ana Wash tributary northeast of Redlands and south of Morton Canyon, from interpretation of 1985 arterial photographs. The CNDDB notes that this identification needs field verification of vegetation condition and composition. Another occurrence was mapped regionally, and is found outside of the Planning Area, in a tributary to Reche Canyon, south of Loma Linda; this stand was damaged by off-road vehicles. The CNDDB ranks this natural community as G3 on a global and S3.2 on a statewide basis.

**Southern Sycamore Alder Riparian Woodland.** Found typically along rocky streambeds subject to seasonally high-intensity flooding, this tall, open, broadleafed, winter-deciduous woodland has been identified along portions of the Santa Ana River north and east of the Planning Area, and along canyons tributary to San Timoteo Canyon in the southern Planning Area. The San Timoteo Canyon stands were mapped originally over 50 years ago as a closed canopy woodland dominated by the California Sycamore, White Alder, and Canyon Live Oak. According to the DFG, distinctions between this natural community and Sycamore Alluvial Woodland merit additional study. The CNDDB ranks this natural community as G4 on a global and S4 on a Statewide basis.

**Southern Willow Scrub.** This natural community was formerly found extensively along the major rivers of coastal Southern California, but its extent has been much reduced by urban expansion, flood control, and channel alterations. Southern Willow Scrub is found within the Planning Area along a west-facing drainage of the Crafton Hills between about 2,600 and 2,800 feet. A typical Southern California thicket is made up of several Willow species, with scattered Cottonwood and Sycamore. The CNDDB ranks this natural community as G3 on a global and S2.1 a Statewide basis.

**Canyon Live Oak Ravine Forest** Although this natural community does not lie within the planning area boundary, this type of broad-leaved closed canopy upland forest is found along tributaries to Mill Creek southwest of Morton Peak in San Bernardino. According to the CNDDB, this natural community is presumed extant and needs field verification of vegetation condition and composition. The CNDDB ranks this natural community as G3 on a global and S3.3 on a statewide basis.

**Other Natural Communities.** Additional CNDDB-identified communities in the vicinity include Southern Riparian Forest and Southern Cottonwood Willow Riparian Forest. Southern Riparian Forest is found along Yucaipa Creek north of Highway 10, east of the Redlands Planning Area. The CNDDB does not identify any dominant species within the stand, but notes that some vegetation has been damaged by off-road vehicles. The CNDDB ranks this natural community as G4 on a global and S4 on a statewide basis.

The Southern Cottonwood Willow Riparian Forest is found along Oak Glen Creek northeast of Yucaipa, east of the Redlands Planning Area. A typical stand would be comprised of tall, open, broadleafed winter-deciduous riparian forest, dominated by Fremont Cottonwoods, Black Cottonwoods, and several tree willows, with an understory of shrubby willows. This stand was mapped from 1980 aerial photos, according to the CNDDB. The CNDDB ranks this natural community as G3 on a global and S3 on a statewide basis.

The San Bernardino Valley Audubon Society reports that the Crafton Hills contain some Coastal Sage Scrub. Coastal Sage Scrub is typified by low-growing shrubs including a variety of species, such as California Sagebrush, Sage, Baccharis, Lupine, and California Buckwheat. Coastal Sage Scrub, sometimes called "soft chaparral," is often found on steep, south-facing slopes, and is lower and more open than chaparral. Chaparral is also found scattered throughout the Planning Area, and is described below in Section 5.3.

### Wetlands

For purposes of this report, wetlands are considered to be transitional areas between terrestrial and aquatic systems, where the water table is usually at or near the surface, or the land is covered by shallow water. Under a unified methodology now used by Federal agencies, wetlands are defined as "those areas meeting certain criteria for hydrology, vegetation, and soils."

Historically, the Redlands area was reported to contain patches of wet or swampy ground. Over the last 150 years, these wet areas have generally been drained or filled, and no wetlands have been identified by the CNDDB as existing within the Planning Area. However, the presence of several riparian areas suggests that freshwater wetlands might be found adjacent to or adjoining the waterways. Since no comprehensive inventory of biotic resources (including wet areas) within the Planning Area has been done, protective policies within the General Plan anticipate identification of wetlands, but do not describe site- or area-specific strategies for preservation. Such measures may be detailed in the City's Master Biotic Management Plan.

### Plant Species

**Nevin's Barberry.** This plant is found along an ephemeral stream in a southwest side canyon of San Timoteo Canyon, and at the mouth of Scott Canyon southwest of Redlands. The Tri-County Conservation League reports that potential Barberry habitat extends along the north-facing slopes of the southern hills in

San Timoteo Canyon. Nevin's Barberry is a State Endangered Species, and is listed by the Federal government as a Category 1 species. The CNDDB ranks this plant as G2 on a global and S2.2 on a statewide basis.

**Payson's Jewelflower.** Found in the southwestern corner of the Planning Area in the San Timoteo Canyon-Badlands area, Payson's Jewelflower is listed as a Federal Category 2 species. The CNDDB ranks this plant as G2? on a global and S2? on a statewide basis.

**Santa Ana River Wooly Star.** This perennial plant inhabits sandy areas of flood deposits, and survives an average of four to five years, reproducing by seed. They are thought to be pollinated by several species, including fly, bee, and hummingbirds. The Wooly Star is recognizable by its sparse silver-grey wooly foliage and star-shaped flowers ranging from violet to sapphire blue. Flood control projects along the mountains-to-ocean Santa Ana River corridor have historically reduced the movement and influx of fresh sand available for Wooly Star colonization, and is now on both the Federal and State Endangered Species' lists. As a relatively small shrub that appears to require full sunlight, it probably cannot successfully compete with larger woody shrubs which eventually move in to colonize the sandy flood plains, and the Wooly Star seems to need new expanses of sand periodically to successfully compete and maintain its population. The "new" sand can be freshly deposited, or can occur in areas previously vegetated which were scoured or re-sorted by floodwaters. The present remaining distribution of the Wooly Star is largely restricted to the Santa Ana River Wash between San Bernardino International Airport and the San Bernardino Mountains, north of Redlands. The Planning Area natural community with which the Wooly Star is frequently associated is the Riversidean Alluvial Fan Sage Scrub community. Environmental review on the construction of the Seven Oaks Dam addressed the species' reliance on the fresh sand brought by flood waters, since Dam construction is expected to reduce or eliminate that supply. A Wooly Star Management Plan containing a mitigation program was drafted to minimize effects on the remaining Wooly Star population. The CNDDB ranks this plant as G4T1 on a global and S1.1 on a statewide basis.

**Slender-horned Spineflower.** This Federal and State Endangered Species is only known to exist at a few locations, and, within the Planning Area, is primarily clustered around Orange Street north of Redlands, within the Santa Ana River Wash. Unlike the Wooly Star, the Spineflower seems to occur only in those sandy areas that lack any evidence of surface disturbance by flood or other causes. Because it is a small, flat-growing annual, active only for a few weeks in the spring and early summer, the Spineflower is difficult to find. The *Santa Ana River Resource Management Plan Scoping Project* (April 1988) states that, as with the Wooly Star, there has never been a careful and thorough survey of the distribution of the Spineflower.[1] The CNDDB ranks this plant as G1 on a global and S1.1 on a statewide basis.

<u>Animal Species</u>

**Black-shouldered Kite.** This bird forages in open space and agricultural areas, according to the San Bernardino Valley Audubon Society. The Black-shouldered Kite is considered a "fully protected" species under DFG codes. The CNDDB ranks this species as G5 on a global and S3 on a statewide basis.

**California Gnatcatcher.** Often found in low-growing scrub, this small insect-eating bird is a Species of Special Concern according to the DFG. Its location within the Planning Area has not been mapped by the DFG, although the San Bernardino Valley Audubon Society and the Tri-County Conservation League believes the Gnatcatcher may be present in portions of the Santa Ana River and Mill Creek washes, and the friends of Live Oak Canyon report that the bird can occasionally be seen in stands of California Sage and Brittlebrush in Live Oak Canyon. The CNDDB ranks this species as G2 on a global and S1 on a statewide basis.

[1] URS Consultants, *Santa Ana River Resource Management Plan, Scoping Project,* April 1988, pp. 26-27.

**Willow Flycatcher.** Although this bird's breeding territory covers much of the United States, its status within California is tenuous enough that it is being considered for listing as a California Endangered Species. The Willow Flycatcher's descriptive name suggests its habitat (Willow or Alder thickets along riparian ways or wetlands) and its diet. The San Bernardino Valley Audubon Society reports its presence within the Planning Area. The CNDDB ranks this species as G5 on a global and S2 on a statewide basis.

**Yellow-breasted Chat.** The Chat prefers brushy tangles in riparian areas and is relatively shy, making it difficult to spot, unless it is engaged in its distinctive display flight: hovering with slow, deep-flapping wings and dangling feet. The loss of riparian areas throughout the State has led to this bird's status as a California DFG Species of Special Concern. The San Bernardino Valley Audubon Society has identified the Yellow-breasted Chat's presence within the Planning Area. The CNDDB ranks this species as G5 on a global and S3 on a statewide basis.

**Cooper's Hawk.** A fast and powerful flier, the Cooper's Hawk hunts for small birds and mammals by flying low over trees, traveling short distances at a time, and using the terrain for concealment. Its natural range stretches from southern Canada to north Mexico, and it has been known to winter as far south as Costa Rica. Cooper's Hawk is a California DFG Species of Special Concern, and has been reported by the San Bernardino Valley Audubon Society and cited in the *Sunset Hills Deer Management Plan* (1990) as present within the Planning Area. The CNDDB ranks this species as G4 on a global and S3 on a statewide basis.

**Ferruginous Hawk.** The Ferruginous Hawk winters in Southern California, feeding primarily on small rodents. Due to a loss of foraging habitat, these hawks have declined in numbers and are classified as a Federal Category 2 species. The San Bernardino Valley Audubon Society reports that the hawk has been sighted within the Planning Area. The CNDDB ranks this species as G4 on a global and S? on a statewide basis.

**Prairie Falcon.** The decline in this species in recent years leading to its classification as a California DFG Species of Special Concern is attributed to rodent-poisoning programs and nest-robbing by falconers. The Prairie Falcon is known as a fast flier and mediocre hunter. The San Bernardino Valley Audubon Society reports its presence within the Planning Area. The CNDDB ranks this species as G5 on a global and S5 on a statewide basis.

**Golden Eagle.** The Golden Eagle is a DFG Species of Special Concern. Although not listed by the CNDDB as present within the Planning Area, the *Santa Ana River Resource Management Plan Scoping Project* (April 1988) notes that the species may use the Santa Ana River Wash as part of its foraging area. Suitable nest sites exist nearby in the San Bernardino Mountains. The Golden Eagle is uncommon and declining in Southern California, due to urbanization, and requires a very large foraging area on the order of several square miles, which means that it is very vulnerable to human encroachment. The Eagle eats rabbits and large rodents, and may scavenge on dead mammals. The CNDDB ranks this species as G4 on a global and S3 on a statewide basis.

**Tri-colored Blackbird.** Primarily a California bird, the Tri-colored Blackbird feeds on grasshoppers and other insects found in agricultural fields and riparian areas. Since it is frequently associated with wetlands, the species has diminished in recent years as the destruction of wetlands throughout the State has progressed. The San Bernardino Valley Audubon Society reports that this bird was sighted nesting in a canal between downtown Redlands and California Street. The species is classified as a Federal Category 2 species. The CNDDB ranks this species as G3 on a global and S2 on a statewide basis.

**Least Bell's Vireo.** This insectivorous bird was once widely distributed throughout Central and Southern California, but is now restricted to only a few localities. It is thought to winter in southern Baja California or Western Mexico, and is a summer resident of California riparian habitats, particularly Willow-Cottonwood habitat. The Vireo, which is listed on both the State and Federal Endangered lists, is threatened by habitat loss and degradation and by nest parasitism by the Brown-headed Cowbird. Although the CNDDB does not identify any

Least Bell's Vireo locations within the Planning Area, the Tri-County Conservation League notes that upstream portions of San Timoteo Canyon are used by the Vireo. Environmental documents on the Santa Ana River Mainstream Project identify Least Bell Vireo populations downstream of the Redlands Planning Area in the Prado Flood Control Basin. The CNDDB ranks this species as G5T2 on a global and S2 on a statewide basis.

**Long-eared Owl.** The San Bernardino Valley Audubon Society reports that this Owl has been sighted within the Planning Area. The Long-eared Owl feeds mainly on rodents and, due to a loss of habitat within the State, is classified as a California DFG Species of Special Concern. The CNDDB ranks this species as G5 on a global and S3 on a statewide basis.

**Los Angeles Pocket Mouse.** This small, nocturnal mammal has been identified along Reche Canyon, to the west of the Planning Area. The Pocket Mouse is thought to subsist on seeds and insects. Although not listed by the CNDDB as present within the Santa Ana River Wash, the local Audubon Society notes that the Pocket Mouse is a likely inhabitant of the Riversidean Alluvial Fan Sage Scrub which is distributed throughout the Wash. The Pocket Mouse has been classified as a Federal Category 2 species. The CNDDB ranks this species as G5T1T2 on a global and S? on a statewide basis.

**Merriam's Kangaroo Rat.** Feeding on seeds, forbs, and leaves, this small, buff-colored rat may be found in Riversidean Alluvial Fan/Coastal Sage Scrub, according to the local Audubon Society. Merriam's Kangaroo Rat is not currently listed with the CNDDB as a Species of Special Status, although the San Bernardino Valley Audubon Society notes that its status is of some concern.

**Stephen's Kangaroo Rat.** Once more widely distributed, the Stephen's Kangaroo Rat has not been conclusively identified as occurring within the Planning Area, although the CNDDB identifies a location just to the west, in Reche Canyon, and the Friends of Live Oak Canyon note that the rat may be present within the Canyon. These jumping rodents, which subsist on seeds and leaves, are physiologically suited for aridity. The Stephen's Kangaroo Rat is a State Threatened Species and a Federal Endangered Species. The major threat to the Stephen's Kangaroo Rat is the destruction or degradation of its habitat. The CNDDB ranks this species as G2 on a global and S2 on a statewide basis.

**Reptile Species**

**Orange-throated Whiptail.** The CNDDB has identified this lizard as present in Reche Canyon, south of the Planning Area. The *Santa Ana River Resource Management Plan Scoping Project* (April 1988) and the Tri-County Conservation League additionally identify the Orange-throated Whiptail as present within the Upper Santa Ana River Wash, and possibly within Mill Creek Wash. According to the *Scoping Project*, the Whiptail inhabits open sandy areas in scrub, living on buried insects and their larvae. The Orange-throated Whiptail is a Federal Category 2 species. The CNDDB ranks this species as G5 on a global and S2 on a statewide basis.

**San Diego Horned Lizard.** This lizard, a Federal Category 2 species, is known to many as a horned "toad." The horned "toad's" popularity among children and other enthusiasts may be a contributing factor in the decline of the species. The CNDDB places it in a general locality centered around Barton Road and Bryn Mawr Avenue at the western edge of the Planning Area. The San Bernardino Valley Audubon Society and Tri-County Conservation League note that it may also be found in sandy open space areas throughout the Planning Area, and within the Riversidean Alluvial Fan Sage Scrub in the Santa Ana River and Mill Creek washes. The CNDDB ranks this species as G4T3 on a global and S2 on a statewide basis.

## 7.3 "Common" Species and Habitats

Species which are considered "common" today are not protected under State or Federal law from displacement or destruction due to human activity. Common species may at some point become "rare enough" to qualify for protection under the law, at which time their population may have suffered a significant loss in numbers and genetic diversity, casting doubt on their ability to ever recover. To prevent this eventuality requires consideration of these species well in advance of that date, and the design of conservation policies which emphasize identification of and preservation of these species' habitat.

No single, comprehensive, field-based inventory of species has been done for the Redlands Planning Area. MEA Table 7.4, Documents Containing Species Inventories or Species Discussions Relevant to the Redlands Planning Area, should be referred to which lists publicly available environmental documents which contain published lists of species inventories or contain detailed discussions of these "common" species in portions of the Planning Area. Taken together, these lists and discussions can be expected to represent the majority of the plant and animal species in the Redlands area. In addition, certain environmental or neighborhood groups and research institutions or agencies have an active interest in species and open space preservation within the area, and may keep inventory lists. Some of these groups are listed in MEA Table 7.3.

Based on previously published environmental documents and interviews with some of the groups listed in MEA Table 7.3, a brief discussion on "common" species and habitats in the Redlands Planning Area follows. The distinction between species and habitats is admittedly artificial, since the two are inextricably linked. They are separated here for ease of discussion, although each section contains aspects of the other.

**Table 7.3**
**Selected Organizations and Agencies Interested in Redlands Planning Area Species and Open Space Preservation, and Who May Provide Species Inventory Lists**

San Bernardino Valley Audubon Society
California Department of Fish and Game
California Native Plant Society, San Bernardino Chapter
Crafton Hills Conservancy
Friends of Live Oak Canyon
Friends of San Timoteo Canyon
San Bernardino County Museum of Natural History
Sierra Club, San Gorgonio Chapter
Tri-County Conservation League
U.C. Riverside, Department of Earth Sciences
U.S. Fish and Wildlife Service
U.S. Forest Service, San Bernardino National Forest

### "Common" Species

Historically, common animal species which may have been observed in the Planning Area would have included Coyote, Fox, Deer, Raccoon, Ground-squirrel, Gopher, Rabbit, Field Mice, Rats, and a variety of reptile and bird species, including raptors. Mountain Lions known to reside in the San Bernardino Mountains are believed to have traveled down the waterways out of the mountains at certain times, searching for food or for mates. Plant and tree species once common in the region are described in MEA Section 7.2 under Natural Communities, and are mentioned below under Other Areas.

**Table 7.4**
**Documents Containing Species Inventories or Species Discussions Relevant to the Redlands Planning Area**

U.S. Army Corps of Engineers, *Santa Ana River, Design Memorandum No. 1: Phase II GDM on the Santa Ana River Mainstem, Including Santiago Creek, Volume 8: Environmental,* August 1988. Area covered: Santa Ana River Wash and environs, North Redlands, Mentone, and Northwest Redlands planning sectors.

Michael Brandman Associates, Inc., 1987, unpublished surveys and reports. Area covered: Upper Santa Ana River Wash.

URS Consultants, *Santa Ana River Resource Management Plan: Scoping Project*, Prepared for the San Bernardino County Land Management Department, April 1988. Area covered: Santa Ana River Wash and environs, North Redlands, Mentone, and Northwest Redlands planning sectors.

The Planning Group, *Sunrise Ranch Planned Unit Development and General Plan Amendment, FEIR,* prepared for San Bernardino County, January 1, 1986. Area covered: Mentone area, Santa Ana River Wash.

URS Consultants, *Inland Valley Development Agency Redevelopment Plan, FEIR,* prepared for Inland Valley Redevelopment Agency, April 1990. Area covered: West Redlands, Northwest Redlands, and North Redlands planning sectors.

ERC Environmental Systems Company, Sedway Cooke Associates, Willdan Associates, *County of San Bernardino General Plan FEIR*, May 1989. Area covered: San Bernardino County.

San Bernardino County Environmental Public Works Agency, Land Management Department, Office of Planning, *San Bernardino County Background Appendix, for use with the General Plan and General Plan FEIR*, July 1989. Area covered: San Bernardino County.

URS Consultants, *East Valley Corridor Specific Plan, FEIR.* County of San Bernardino Office of Special Districts, County Service Area 110, October 1988. Area covered: West Redlands, Northwest Redlands, North Redlands planning sectors, a small portion of South Redlands planning sector.

Tom Dodson and Associates, *Agreement Adopting Restated Conditions of Approval for Pharris Orange Street Aggregates Processing Plant Permit, DEIR,* Prepared for the City of Redlands, September 1990. Area covered: Santa Ana River Wash and environs.

Taylor Research Associates, *Redlands Municipal Airport Master Plan, FEIR*, Prepared for the City of Redlands, August 1981. Area covered: North Redlands and Mentone planning sectors.

Tom Dodson and Associates, Live Oak Canyon *Redlands Southeast General Plan Amendment, FEIR,* Prepared for the City of Redlands, October 1987. Area covered: San Timoteo Canyon/Live Oak Canyon planning sectors.

Envicom Corporation, *Crafton Hills Planned Unit Development, FEIR,* July 1985. Area covered: Crafton planning sector.

C.M. Engineering Associates, Inc., *Tentative Tract 13294, DEIR*, Prepared for the City of Redlands, January 1988. Area covered: San Timoteo/Live Oak Canyon planning sector.

Southern California Association of Governments with Jones and Stokes Associates, Inc., *Draft Growth Management Plan, DEIR,* October 1988. Area covered: Southern California.

Tierra Madre Consultants for Urban Environs, *Sunset Hills Deer Management Plan,* October 1990. Area covered: South Redlands and San Timoteo/Live Oak Canyon planning sectors.

Dangermond and Associates, RECON. *Multiple Species Habitat Conservation Plan*. Prepared for San Bernardino County, January 1991.

Chambers Group, *Hidden River Country Club Estates, DEIR*, prepared for the City of Redlands, 1995.

Recent attention has been focused on the maintenance of Mule Deer populations in southeastern Redlands. During the biological assessment for the Southeast Area General Plan Amendment, Mule Deer were observed in the area, and a mitigation measure specifying retention of the deer herd was adopted. In October 1990 a local consulting firm prepared the Sunset Hills Deer Management Plan. The Deer Management Plan recognizes that the deer using the habitat within southeastern Redlands and in the Sunset Hills project area are members of a much larger population, distributed throughout the Badlands, within both Riverside and San Bernardino counties.

Although Mule Deer are not listed by state or federal agencies as special status species, Redlands has decided that a presence of deer is important enough to justify implementation of a Deer Management Plan. According to the Management Plan, retention of Mule Deer relies on three conditions. The first is that the Badlands deer population must persist into the indefinite future. Although the Badlands is not within the Redlands Planning Area, the City can coordinate with Riverside County on implementation of their *Multiple Species Habitat Conservation Plan*, which includes conceptual plans for preserving the Badlands area in a reserve.

The second condition required to maintain the herd is that Mule Deer must have suitable access to the area. This means that wildlife corridors connecting with other deer habitat areas must be preserved, enhanced, and maintained. Corridors include the Badlands, San Timoteo and Live Oak canyons, the Crafton Hills, and Mill Creek and Santa Ana River washes. Since some of these corridors are separated by freeway or major thoroughfares, wildlife undercrossings would need to be provided. The Tri-County Conservation League is advocating preservation and enhancement of a regional corridor stretching from the San Bernardino Mountains along the Santa Ana River to the Pacific Ocean. This concept is expressed in the Santa Ana River Corridor Trail System Master Plan.

The last condition required to maintain the herd is the provision of suitable deer habitat within the specific project area; proposals for accomplishing this are detailed in the Management Plan.

There have been reports from the U.S. Forest Service that Mountain Lion (also known as Cougars or Pumas) may occasionally be present within the Badlands area. The "big cat" population would benefit from the maintenance of the deer population which helps sustain them. Similarly, the deer herd population could be kept in check from overly rapid proliferation if a balance could be achieved with the Mountain Lion population. If wildlife corridors for the movement of deer are maintained, it is possible that mountain lions would follow the same pathways.

According to the Tri-County Conservation League, the hills on both sides of San Timoteo Canyon are heavily populated with raptors (birds of prey), especially from Live Oak Canyon eastward. While some raptors potentially present within the Planning Area are species of special concern (Golden Eagle, Cooper's Hawk), others (Red-tailed Hawk, Turkey Vulture, Merlin) are still legally considered "common." These birds have suffered a dramatic loss of foraging habitat as a result of urbanization, which has displaced or destroyed the smaller animals on which they feed. As noted below, the combination of agricultural groves and fields continues to provide some habitat for these birds, as does the open space within and surrounding the Planning Area.

### "Common" Habitats

Common habitats include portions of the urban environment, agricultural areas, and other areas comprised of native and non-native vegetation.

**Urban habitat.** Habitat found within the urban environment includes those areas within and fringing the City which provide food and living space for birds and mammals. These might include Redlands' parks, street trees, parkway and median-strip landscaping, yard trees and shrubs, golf courses, and undeveloped parcels. Although there has been no systematic inventory of these components of the City's urban forest, the maintenance

of street trees is considered in Redlands' Street Tree Plan (comprised of City Council Resolution No. 4414 and Ordinance No. 2040). Street trees are under the care of the City of Redlands, Public Works Department, which prepared a list of Redlands' official street trees, as shown in MEA Table 7.5, City of Redlands Official Street Tree List.

**Table 7.5**
**City of Redlands Official Street Tree List**

| Common Name | Latin Name | Native To: |
|---|---|---|
| American Sweet Gum | *Liquidambar styraciflua* | Eastern United States |
| Ash | *Fraxinus oxycarpa* | Asia Minor |
| California Fan Palm | *Washingtonia filifera* | Southwestern Deserts |
| Camphor Tree | *Cinnamomum camphora* | China, Japan |
| Canary Island Pine | *Pinus canariensis* | Canary Islands |
| Chinese Flame Tree | *Koelreuteria bipinnata* | China |
| Cork Oak | *Quercus suber* | Mediterranean |
| Crapemyrtle | *Lagerstroemia indica* | China |
| Eastern Redbud | *Cercis canadensis* | Eastern United States |
| Goldenrain Tree | *Koelreuteria paniculata* | China |
| Guadalupe Palm | *Erythea edulis* | Guadalupe Island off Baja |
| Holly Oak | *Quercus ilex* | Mediterranean |
| Jacaranda | *Jacaranda mimosifolia* | Brazil |
| Knobcone Pine | *Pinus attenuata* | Nevada foothills and Baja |
| London Plane Tree | *Platanus acerifolia* | United States |
| Magnolia | *Magnolia grandiflora St. Mary* | Eastern United States |
| Maidenhair Tree | *Gingko biloba* | China |
| Modesto Ash | *Fraxinus modesto* | Arizona |
| Purple Orchid Tree | *Bauhinia variegata* | India, China |
| Queen Palm | *Arecastrum romanzoffianum* | South America |
| Silk Tree | *Albizia julibrissin* | Asia (from Iran to Japan) |
| Southern Live Oak | *Quercus virginiana* | Eastern United States |
| Tulip Tree | *Liriodendron tulipifera* | Eastern United States |
| Windmill Palm | *Trachycarpus fortunei* | Himalayas |

Source: City of Redlands, Ron Mutter, Public Works Department, April 1995.

Although few of these species are native to the western United States, birds and mammals who have managed to persist thus far in an urban setting are considered to be urban-adapted, meaning that they can function and even thrive in a non-native environment. It is possible that a greater number and diversity of animal species

would be observed within the City if more native plants and trees were introduced into the urban environment. The introduction of more native vegetation, in addition to potential water conservation benefits, might encourage recolonization of the area by native animals which are not urban-adapted, and presently live at the fringes of the City.

**Agricultural habitat.** The established groves, fields, and horticultural plantings throughout the Planning Area have become important habitat for the wildlife which has managed to survive the loss of native habitat. According to the *East Valley Corridor Specific Plan FEIR*, October 1988, and 1994 aerial photography, a distinctive citrus grove assemblage of wildlife persists, composed largely of predatory mammals and a few noteworthy birds.[2] Coyotes, Foxes, Striped Skunks, Raccoons, and Opossums are nocturnal animals characteristic of extensive groves. Ground Squirrels, Jackrabbits, Cottontails, and Deer may be seen, as can Crows, Starlings, Ring-necked Pheasant, Towhees, and Mourning Doves. Smaller ground-dwelling animals, including reptiles, rodents, and ground-nesting songbirds, tend to be absent within established agricultural areas due to repeated cultivation and herbicide treatment. The edges of groves and fields often support the more hardy ground-nesting species, such as Roadrunners, Meadowlarks, and Gophers.

Horticultural plantings, such as the rows of Fan Palms which line the major citrus groves in the East Valley Corridor, provide substantial nesting habitat for resident birds. Birds known to nest in these Palms include Crows, Starlings, American Kestrels, Barn Owls, Flickers, and Songbirds.

The combination of groves next to areas of remaining alfalfa or other low-growing fields in the East Valley Corridor provides good foraging habitat for birds of prey. Red-tailed Hawks are fairly common, as are American Kestrels, Shrikes, Barn Owls, and, occasionally, Black-shouldered Kites.

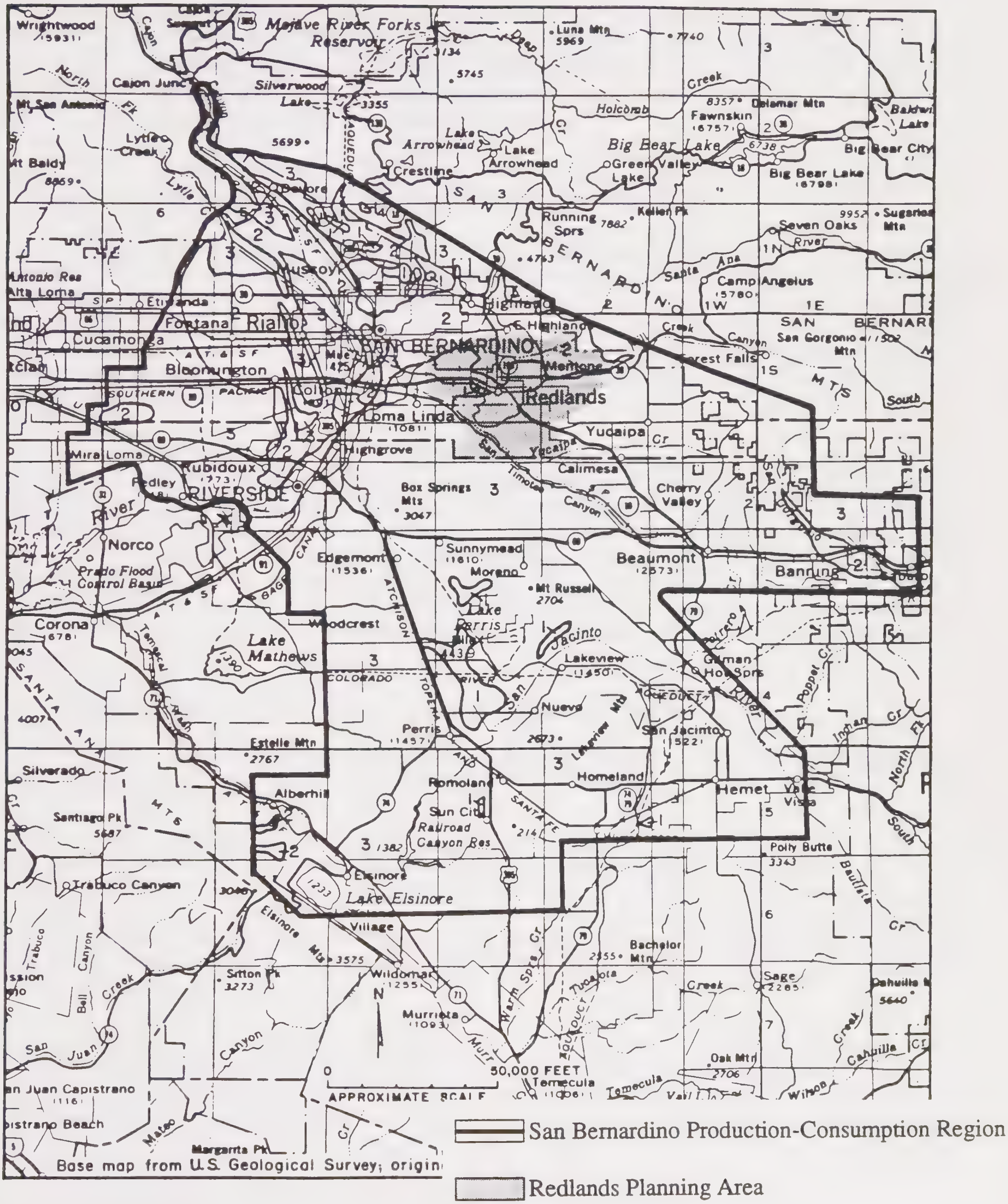
**Other areas.** Outside of the urban and agricultural portions of the Planning Area, vegetative associations other than those described in Section 5.2 under Special Status Species, Natural Communities, are primarily composed of chaparral species, including Scrub Oak, Toyon, and Coastal Sage Brush and Coastal Sage Scrub, interspersed with introduced annual grasses. The chaparral community provides a suitable habitat for a diversity of wildlife. Although component species are not generally recognized as species of special status, the loss of native chaparral species throughout California has reduced the amount of habitat available for native bird and mammal species.

- **BIOTIC RESOURCES, SOURCES OF FURTHER INFORMATION:**
    - See MEA Table 7.3 for a list of relevant organizations and agencies.
    - See MEA Table 7.4 for a list of relevant documents.

[2] *URS Consultants, East Valley Corridor Specific Plan FEIR*, October 1988, pp. 65-67.

# 8.0 MINERAL RESOURCES

Redlands General Plan / MEA




Redlands Planning Area
MEA Figure 8.1

Sources: California Dept. of Mines & Geology. Map showing generalized classification of aggregate resources of the San Bernardino P-C Region. Miller, R.V., 1987. Classification of Sands and Gravel Resource Areas, San Bernardino Production Consumption Region, CDMG Publication, Special Report 143, Part VII.

# San Bernardino Production-Consumption Region and Mineral Resource Zones

SMITH, PERONI & FOX
STEVEN C, SUITT AND ASSOC.

- Areas classified as MRZ-2 indicate that adequate information exist to prove that significant mineral deposits are present or where it is judged that a high likelihood for their presence exits. These deposits must be marketable under present technologic and economic conditions or which can be estimated to exist in the foreseeable future, and that contain in excess of $5 million worth of aggregate material measured in 1978 dollars.

- Areas classified as MRZ-3 incorporate land containing aggregate mineral deposits, the significance of which cannot be evaluated from available data.

The most important classification is MRZ-2 because it signifies a valuable mineral resource. To further evaluate MRZ-2 areas, the CDMG has subdivided the MRZ-2 classification into sector designations. This assists with defining the quantities of available high quality mineral resources. Sectorization is important because it provides a semi-quantifiable estimate of construction aggregate resources which are likely to be available to satisfy societies needs for the next 50± years. Additionally, areas within MRZ-2 classifications are sectorized if they have current land uses which are similar to those areas that have had feasible mineral extraction in the past. According to the CDMG (Reference 5), MRZ and sector designations have not been amended since 1987.

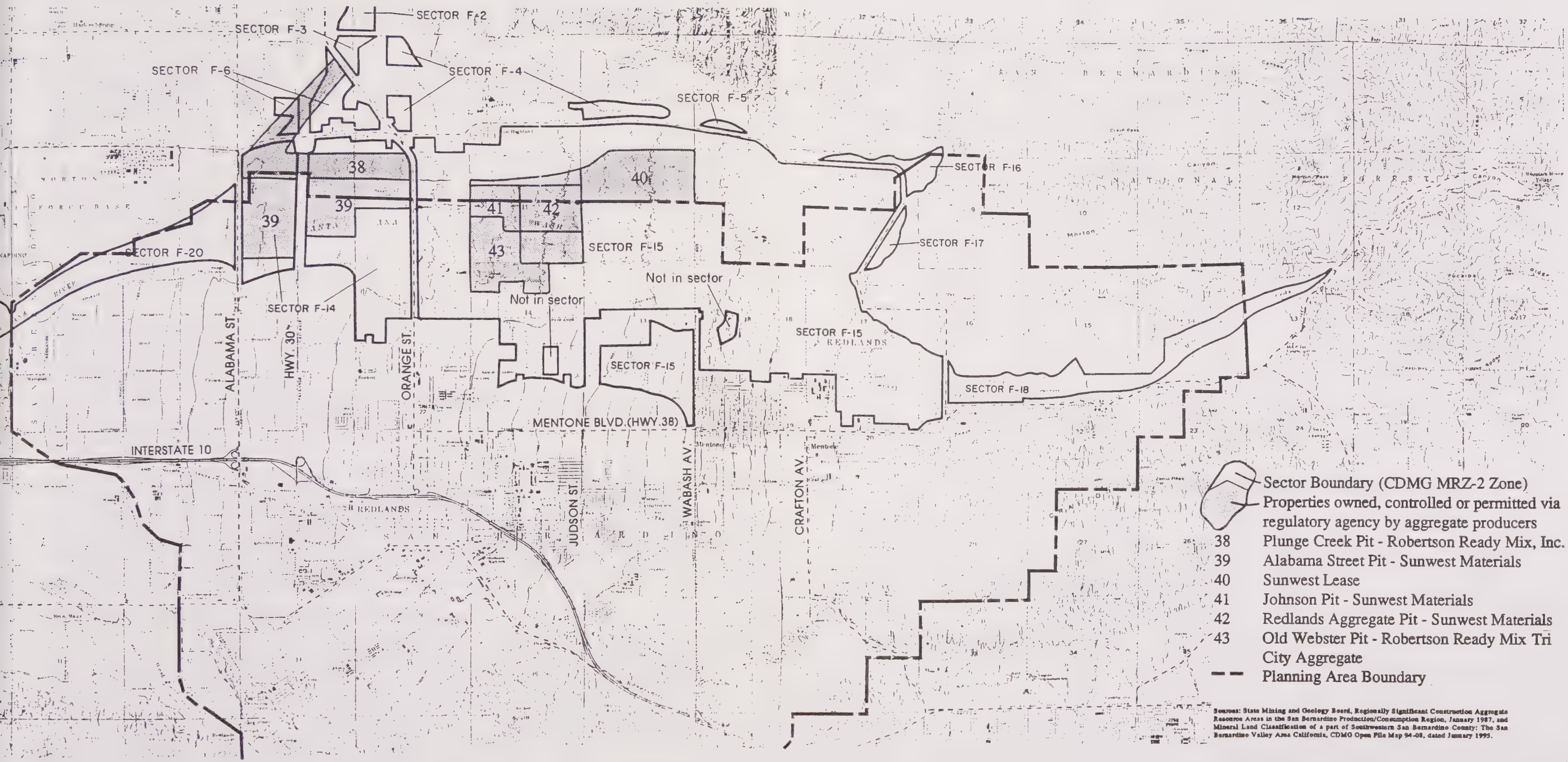
Those portions of the Redlands Planning Area that have been classified as a MRZ-2 with resource sector designations are shown on MEA Figure 8.2, Regionally Significant Construction Aggregate Resource Areas in the San Bernardino Production/Consumption Region. These sectors, located primarily in the northerly Redlands Planning Area (F-14 through F-18 and F-20), indicate the existence of mineral deposits that meets certain criteria for value and marketability as defined by the CDMG and SMARA. The City of Redlands is required by SMARA to adopt policies recognizing the importance of all CDMG identified mineral resources (MRZ-2), clarifying the intent for which this information is to be used when making land use decisions in areas designated to be of statewide or regional significance, and emphasizing the conservation and development of the sectorized mineral deposits.

**Planning Area Mineral Resources and Construction Aggregate Sites**

Based on a review of Reference 1 and 2, a summary description of the MRZ-2 sand and gravel construction aggregate deposits in the Redlands Planning Area is as follows.

**Mineral Resources.** Along the southwestern edge of the San Bernardino Mountains, the Santa Ana River emerges from its narrow canyon onto a widening flood plain in the eastern arm of the San Bernardino Valley. Joined by the effluence of Mill Creek, the Santa Ana River flows across a broad wash for about six miles before entering the constriction of the Santa Ana River channel. The river courses through another 18 miles before reaching the boundary of the Production-Consumption Region at a point near the City of Riverside. The Santa Ana Wash contains almost 34 square miles of land classified as MRZ-2. The river channel contains an additional ten square miles of land classified as MRZ-2.

The deposits of alluvium underlying the Santa Ana River are topped by an upper layer of younger deposits suitable for use as construction aggregate. This layer, made up of deposits of boulders, gravel, sand and occasional clay, overlies an older weathered alluvium which is probably unsuitable for use as concrete aggregate (Reference 2). The thickness of the overlying younger alluvium varies from about 15 feet to 390 feet. This large variation in thickness is due in part to tectonic movement of the area, forming downwarps in some areas which are then infilled, and upwarps in other areas, such a near the San Jacinto fault, that tend to thin the deposit. (See Section 2.1, Geology and Soils, for description of the regional and local geologic setting).




Redlands Planning Area
MEA Figure 8.2

# Regionally Significant Construction Aggregate Resource Areas in the San Bernardino Production/Consumption Region

SMITH, PERONI & FOX
STEVEN C. SUITT AND ASSOC.
BLAYNEY, DYETT, GREENBERG
ESRI

The younger alluvial wash material overlying the upper Santa Ana Valley is composed chiefly of quartz monzonite-granodiorite clasts with lesser amounts of gneissic granite, granite, aplite, and quartz diorite. The deposit is poorly sorted and consists of about 40 percent gravel with an average maximum size of about 10 inches.

**Construction Aggregate Sites.** Approximately 90 percent of the Santa Ana River and Wash portion of the Redlands Planning Area within the San Bernardino Production-Consumption Region is owned by public agencies. These agencies include the Bureau of Land Management, San Bernardino County, City of Redlands, and the San Bernardino Valley Water Conservation District.

Within the remaining available areas of the River and Wash, there are currently six potential or existing aggregate production sites or plants. The location of each site is depicted on MEA Figure 8.2. Some of these sites have been or are operating under permits issued by San Bernardino County (Reference 4 and 6). As of early 1995, five of these sites were located in the CDMG Sector F-14 and F-15 portions of the Redlands Planning Area (Reference 5). The primary construction aggregate operators of these existing or potential operations are Sunwest Materials (Formerly C.L. Pharris Sand and Gravel), and Roberston Ready Mix (Reference 6).

**Regional Mineral Resource Projected Needs**

Based on information available in 1987, the CDMG estimates that the 50± year aggregate needs in the San Bernardino Production-Consumption Region are 476 million tons versus 430 million tons of available, mineable reserves. Reserves are calculated based on areas where mining is permitted by lead agencies having jurisdiction over such land. These identified reserves are anticipated to last until the year 2028. Mineral resources includes both reserves and non-permitted resources. Total sand and gravel resources in the San Bernardino Production-Consumption Region have been estimated at 10.45 billion tons by the CDMG. Although there are significant resources in the Region, without conversion of non-permitted resources into reserves, the Region is expected to have a construction aggregate shortfall within the next 35 years.

Projected needs within the San Bernardino Production-Consumption Region are tabulated and resources and resource use within the Redlands Planning Area are mapped and described by the CDMG. MEA Table 8.2, Projected Aggregate Consumption for San Bernardino Production-Consumption Region shows the regional need, MEA Table 8.3, Aggregate Resources of the San Bernardino Production-Consumption Region lists regional resources, and MEA Table 8.4, Mineral Resource Zones within the Redlands Planning Area presents tonnage available (in millions of tons) by MRZ-2 sector. MEA Figure 8.1, shows the region as defined, and MEA Figure 8.2, maps resource areas in and adjoining the Redlands Planning Area.

## 8.2 Impacts of Mining and Construction Aggregate Processing

A majority of the San Bernardino Production-Consumption Region construction aggregate resources are either within or adjacent to the Redlands Planning Area. Current mineable reserves for the region are anticipated to be depleted by the year 2028 if additional MRZ-2 areas are not made available for permitting (Reference 2). Any loss of current reserves located within CDMG Sector F due to land-use decisions, such that might affect mining access and CDMG designations, or development impacts will possibly shorten the above depletion date. The impacts from the loss of mineral resources is primarily economic. The CDMG has termed the loss of mineral resources as a significant geologic hazard worth several billion dollars.

Mining and construction aggregate processing within existing and potential production sites impacts existing, nearby and potential development. These impacts include noise, dust and truck traffic.

**MEA Table 8.2**
**Projected Aggregate Consumption for San Bernardino Production-Consumption Region**
(in million short tons)

| Years | Average Population (millions) | 5-Year Per-Capita Consumption (tons) | Aggregate Consumption (million tons) |
|---|---|---|---|
| 1982-1986 | .83 | 42 | 35 |
| 1987-1991 | .92 | 42 | 39 |
| 1992-1996 | .99 | 42 | 42 |
| 1997-2001 | 1.05 | 42 | 44 |
| 2002-2006 | 1.11 | 42 | 47 |
| 2007-2011 | 1.17 | 42 | 49 |
| 2012-2016 | 1.22 | 42 | 51 |
| 2017-2021 | 1.28 | 42 | 54 |
| 2022-2026 | 1.34 | 42 | 56 |
| 2027-2031 | 1.40 | 42 | 59 |
| Total | | | 476 |

**Projected Aggregate Consumption of Adjacent Production-Consumption Regions**
**(million short tons)**

| | |
|---|---|
| Claremont-Upland (1982-2031): | 245 |
| Orange County-Temescal Valley (1980-2030): | 844 |

Source: California Department of Conservation, Division of Mines and Geology, *Mineral Land Classification of the Greater Los Angeles Area, Special Report 143, Part VII, 1987.*

**MEA Table 8.3**
**Aggregate Resources of the San Bernardino Production-Consumption Region**

| Sector | Permitted (Reserves) Resources (Indicated Category) | Non-Permitted Resources (Indicated and Inferred Category) | Total Resources |
|---|---|---|---|
| A | 10 | 1810 | 1820 |
| B | 120 | 970 | 1090 |
| C | * | 1120 | 1120 |
| D | none | 70 | 70 |
| E | none | 570 | 570 |
| F | * | 4660 | 4660 |
| G | * | 800 | 800 |
| H | * | 5 | 5 |
| I | * | 20 | 20 |
| Total | 430 | 10,020 | 10,450 |

Aggregate resources of the San Bernardino P-C Region (all numbers in million short tons).
* Cannot be shown due to confidentiality of producer data.
Note: All figures over 50 million rounded to nearest 10 million; figures less than 50 million rounded to nearest 5 million tons.
Source: California Department of Conservation, Division of Mines and Geology, *Mineral Land Classification of the Greater Los Angeles Area, Special Report 143, Part VII, 1987.*

**MEA Table 8.4**
**Mineral Resource Zones within the Redlands Planning Area**

Data on Resource Areas and Sectors of the San Bernardino P-C Region
(Taken from Table 7.2, California Division of Mines and Geology, Special Report 143, Part VII, updated to reflect designation boundary changes of resource sectors.)

| Resource Area | Sector | Million Short Tons Resources* (Reserves) |
|---|---|---|
| Santa Ana River and Santa Ana Wash (Upstream of Interstate Hwy 395) | F-1 | 4.7 |
| | F-2 | 8 |
| | F-3 | 17.6 |
| | F-4 | 50 |
| | F-5 | 1.8 |
| | F-6 | 63.7 |
| | F-9 | 6.3 |
| | F-12 | 3.2 |
| | F-14 | 805.2 (**) |
| | F-15 | 2446 |
| | F-16 | 17.1 |
| | F-14 | 6.9 |
| | F-18 | 117.2 |
| | F-20 | 164.6 |
| | F-23 | 22.6 |
| | F-32 | 7.6 |
| | F-33 | 10.4 |
| | Total | 3753 (**) |

Indicates MRZ-2 within Redlands Planning Area.
** Cannot be shown individually due to confidentiality; however, amount is included in total.
Source: California Department of Conservation, Division of Mines and Geology, *Designation of Regionally Significant Construction Aggregate Resource Areas in the Claremont-Upland and San Bernardino Production-Consumption Region, January 1987.*

## References


1. California Division of Mines and Geology, 1987, SMARA Designation Report No. 5.
2. Miller, R. V., 1987, Classification of Sand and Gravel Resource Areas, San Bernardino Production-Consumption Region, CDMG publication, Special Report 143, Part VII.
3. Miller, R.V., 1995, CDMG Geologist, verbal communication, April.
4. Rush, A., 1995, San Bernardino County Planning Department, Mineral Specialist, verbal communication, April.

5. Shumway, D. O., 1995, Mineral Land Classification of a Part of Southwestern San Bernardino County: The San Bernardino Valley Area, California, in press, CDMG publication Open File Map 94-08.
6. Shumway, D.O., 1995, CDMG Geologist, verbal communication, April.

# 9.0 CLIMATE, AIR QUALITY, AND WIND

Redlands General Plan / MEA

# 9.0 CLIMATE, AIR QUALITY, AND WIND

**Summary Extract.** As with many cities favored with a Mediterranean climate and ringed with picturesque mountains, Redlands suffers poor air quality to the extent that the beauty of the City's setting is obscured by haze for a significant portion of the year. The problem is regional in scope, and the Redlands air quality planning effort is part of a larger effort to improve air quality in the South Coast Air Basin. The South Coast Air Basin is a 6,600-mile area bounded by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto mountains to the north and east. According to the *Regional Air Quality Plan,* ozone and particulate matter were identified as the criteria pollutants whose improvement would yield the greatest air quality benefit in the San Bernardino County portion of the South Coast Air Basin. The seasonal Santa Ana winds cleanse the air of "smog," but may widely distribute airborne particulate matter, and, when most severe, pose potential safety hazards.

## 9.1 Climate

The Redlands Planning Area is generally characterized as having a Mediterranean climate, due to the presence of a semi-permanent high pressure zone which lies over the eastern Pacific Ocean, leading to typically warm, dry summers (averaging in the 90s) with occasional periods of extremely hot weather. Winters, though usually mild, are occasionally wet, with precipitation occurring mainly between November and April, and averaging 13 to 20 inches annually. Extreme temperatures range from the low 30s to the low 100s, with an annual mean reading of 64 degrees Fahrenheit.

The northeasterly Santa Ana winds which tend to occur in the late summer and early fall contribute to periods of exceptionally low humidity and high fire danger. (See below for a further discussion of Wind.) Aside from the Santa Ana winds, the South Coast Air Basin experiences very light average wind speeds, with prevailing winds in the Planning Area coming from the west-southwest and west.

The area experiences a persistent low-level temperature inversion during most of the year. Warm air trapped at the surface of the earth beneath a layer of cool, marine air is described as the "base of the inversion." The height of the inversion base determines the maximum volume of air available for the mixing and dilution of pollutants. A higher base provides more air for mixing and dilution of pollutants.

During winter months, early morning inversion bases are typically at the surface. This situation generally causes an accumulation of primary pollutants such as Carbon Monoxide, Nitrogen Oxides, and volatile organic compounds during the early morning hours. By early afternoon, convective currents from surface heating break the inversion layer, allowing trapped pollutants to disperse.

During summer months, the height of the morning inversion base starts higher than in the winter, but doesn't rise as high as the winter inversion layer. Because more solar radiation is available to drive photochemical reactions during the long summer days, and because the afternoon vertical mixing layer is lower than that during winter, higher levels of ozone and particulates occur.

## 9.2 Air Quality

The following discussion is excerpted or adapted from the *Technical Background Report* of the *Regional Air Quality Plan* for San Bernardino County and cities, prepared by The Planning Center and Giroux and Associates in June 1990.

## Meteorology and Air Quality Background

Redlands' air quality problems are a part of the regional air quality issues within San Bernardino County, and, in a broader context, within the South Coast Air Basin (SCAB). Because the issues transcend urban boundaries, the discussion below approaches air quality from a regional perspective, focusing on County-level analysis.

Both the State and federal governments have air quality standards which affect Redlands. There are federal ambient air quality standards for six pollutants, and California has added other types of pollutants (or "species") to the list, established different exposure periods, and required more stringent compliance than the minimums established in the federal standards. The ambient air quality standards (AAQS) currently applicable in California are shown in MEA Table 9.1, Ambient Air Quality Standards.

Pollutants are emitted by various sources, they are transported by prevailing winds horizontally and possibly affected by limits to vertical mixing, and they may be chemically or physically modified in transit before arriving at a specific receptor.

Within the SCAB (which covers southern Los Angeles, western San Bernardino and Riverside and all of Orange counties), standards for ozone ($O_3$), carbon monoxide (CO), nitrogen dioxide ($NO_2$) and 10-micron diameter respirable particulate matter ($PM_{10}$) are routinely violated. Other standards are infrequently violated, if at all. The Clean Air Act (CAA) Amendments of 1990 have mandated that the State Implementation Plan (SIP) for each nonattainment pollutant must document the actions to be taken to bring each airshed into compliance with all national AAQS. If local plans which are consolidated at the state level into a SIP do not show future attainment, a federal implementation plan (FIP) must be prepared by EPA and imposed upon any jurisdiction unable to prepare its own satisfactory plan.

Three of the four pollutants for which the SCAB is designated as a nonattainment area are mainly secondary pollutants which have undergone some amount of transformation during the transport process. Ozone, for example, is completely a product of the photochemical reaction between volatile organic compounds (VOCs) and nitrogen oxides ($NO_x$) under abundant sunlight. $NO_2$ and $PM_{10}$ distributions are comprised of a combination of some pollutants emitted directly and some that have experienced chemical reaction, physical absorption, or gravitational settling. CO, conversely, is almost exclusively an unmodified pollutant that has a very slow atmospheric reaction time. An important effect of reactivity and reaction rates in conjunction with prevailing airflow is that patterns of ozone in San Bernardino County are completely controlled by emissions many miles upwind. Patterns of ambient $NO_2$ or $PM_{10}$ derive from a combination of local sources plus regional effects, while CO concentrations results mainly from short transport distances between closely linked sources and receptors.

While the South Coast Air Basin as a whole is not in attainment with national AAQS, San Bernardino County, by virtue of its location relative to prevailing offshore airflow patterns in winter when CO and $NO_2$ are normally high, is in attainment for national standards for these two pollutants because much of the airflow is from unpolluted mountain areas. On the other hand, when regional airflow is mainly onshore in summer and passes over heavily populated areas of the Basin, the magnitude of nonattainment for ozone and particulate is among the highest in the Basin. Existing air quality in the portion of San Bernardino County within the SCAB is currently monitored by the South Coast Air Quality Management District (AQMD) and the California Air Resources Board (CARB) at six County sites. For purposes of countywide comparison, measurement data at Redlands, downtown San Bernardino and Crestline/Lake Gregory have been assumed as most representative of the eastern San Bernardino Valley, central San Bernardino Valley, and central San Bernardino mountain areas of the County encompassing the major population centroids within that portion of the County within the AQMD. MEA Table 9.2, Percent of Days Exceeding Federal Standards and Maximum Concentrations, 1994, shows recently released data from the AQMD, and compliance status with national AAQS for the 1994 monitoring year.

MEA Table 9.1
Ambient Air Quality Standards

| | California | | Federal | | |
|---|---|---|---|---|---|
| Air Pollutant | Concentration | District Method | Primary (>) | Secondary (>) | Method[a] |
| Ozone | 0.09 ppm, 1-hr. avg. > | U.V. photometry | 0.12 ppm, 1-hr. avg. | 0.12 ppm, 1-hr. avg. | Chemiluminescence |
| Carbon Monoxide | 9.0 ppm, 8-hr. avg. >[b]<br>20 ppm, 1-hr. ave. > | Non-dispersive Infra-red Spectrophotometry | 9 ppm, 8-hr. avg.[c]<br>35 ppm, 1-hr. avg. | 9 ppm, 8-hr. avg.<br>35 ppm, 1-hr. avg. | Non-dispersive Infra-red Spectrophotometry |
| Nitrogen Dioxide | 0.25 ppm, 1-hr. avg. > [g] | Gas Phase Chemiluminescence | 0.053 ppm, ann. avg. [f] | 0.053 ppm, ann. avg. [f] | Gas Phase Chemiluminescence |
| Sulfur Dioxide | 0.04 ppm, 24-hr. avg. ><br><br>0.25 ppm, 1-hr. avg. > | Ultraviolet Fluorescence | 0.03 ppm, ann. avg.<br>0.14 ppm, 24-hr. avg. | 0.50 ppm, 3-hr. avg. | Para-rosaniline |
| Suspended Particulate Matter ($PM_{10}$) | 30 $ug/m^3$, ann. geometric mean ><br>50 $ug/m^3$, 24-hr. avg. > [d] ** | Size Segregated Inlet High Volume Sampling | 50 $ug/m^3$, annual [h] arithmetic mean<br>150 $ug/m^3$, 24-hr. avg. | 50 $ug/m^3$, annual [h] arithmetic mean<br>150 $ug/m^3$, 24-hr. avg. | |
| Sulfates | 25 $ug/m^3$, 24-hr. avg. >= | High Volume Sampling Methylthymol Blue | | | |
| Lead | 1.5 $ug/m^3$, 30-hr. avg. >= | Cadmium Hydroxide Stractan | 1.5 $ug/m^3$, calendar quarter | 1.5 $ug/m^3$, calendar quarter | High Volume Sampling Atomic Absorption |
| Hydrogen Sulfide | 0.03 ppm, 24-hr. avg. >= | Gas Chromatography | | | |
| Vinyl Chloride | 0.010 ppm, 24-hr. avg. >= | | | | |
| Visibility Reducing Particulates | In sufficient amount to reduce the prevailing visibility to less than 10 miles at relative humidity less than 70%, 8-hr. avg. (9am-5pm) | | | | |

Source: SCAQMD, *Draft 1994 Air Quality Management Plan*, April 1994, Table 2-1, pg. 2-2.

[a] Reference method as described by the federal government. An equivalent method of measurement may be used as approved by the federal government.

[b] Effective December 15, 1982. The standards were previously 10 pmm, (12-hour average) and 40 ppm, (1-hour average).

[c] Effective October 5, 1984. The standard was previously .5 ppm, (1-hour average).

[d] Effective August 19, 1983. The standards were previously 60 $ug.m^3$ TSP, (annual geometric mean), and 100 $ug/m^3$ TSP, (24-hour average).

[e] Effective September 13, 1985, standard changed from > 10 $ug/m^3$ (>=9.3 ppm) to > 9 ppm (.+9.5 ppm).

[f] Effective July 1, 1985, standard changed from > 100 $ug/m^3$ (> .0532 ppm) to > .053 ppm (> .0534 ppm).

[g] Effective March 9, 1987, standard changed from >= .25 ppm to .25 ppm.

[h] Effective July 1, 1987. The standards were previously: Primary - Annual geometric mean TSP > 75 $ug/m^3$, and 24-hour average TSP > 260 $ug/m^3$. Secondary - Annual geometric mean TSP > 60 $ug/m^3$, and 24-hour average TSP > 150 $ug/m^3$.

*ppm = Parts per million per volume

**$ug/m^3$ = Micrograms per cubic meter

**MEA Table 9.2**
**Percent of Days Exceeding Federal Standards and Maximum Concentrations, 1989**

| Pollutant | Standard | Eastern S.B. Valley | Central S.B. Valley | Central S.B. Mountains |
|---|---|---|---|---|
| **Ozone** | 1-Hour > 0.12 ppm | 27% | 26 % | 29 % |
| | Max. 1 Hour Conc. (ppm) | 0.23 | 0.25 | 0.27 |
| **Carbon Monoxide** | 1-Hour > 35. ppm | ND | 0% | ND |
| | 8-Hour > 9. ppm | ND | 0% | ND |
| | Max 1-Hour Conc. (ppm) | ND | 9.0 | ND |
| | Max 8-Hour Conc (ppm) | ND | 6.5 | ND |
| **Nitrogen Dioxide** | Annual Avg. > 0.05 ppm | ND | No | ND |
| | Annual Avg. (ppm) | ND | 0.0411 | ND |
| **Respirable Particulate** | 24-Hour > 150 ug/m3 | 0 % | 0 % | 0% |
| | Max. 24-Hour Conc. (ug/m3) | 138 | 147 | 67 |
| | AAM Conc. (ug/m$^3$) | 47.2 | 60.0 | 26.1 |
| | AAM Conc. > 50 ug/m$^3$ | No | Yes | No |

AAM Annual Arithmetic Mean
ND No Data, no measurements at this site.
Source: SCAQMD 1994 Air Quality data.

Ozone is the most pervasive problem pollutant with annual maxima more than double the allowable national standard. Annual Arithmetic Mean (AAM) $PM_{10}$ levels 20 percent above the national AAQS were recorded in the central San Bernardino Valley in 1994. The more localized nature of $PM_{10}$ patterns is seen, however, in the fact that Crestline did not even come close to exceeding the federal $PM_{10}$ standard in 1989. These data suggest that although the Basin Air Quality Management Plan (AQMP) addresses improvement strategies for all four nonattainment pollutants, those measures related to ozone are of primary importance and those associated with $PM_{10}$ are of intermediate importance. CO attainment planning is less critical because CO standards are very infrequently violated.

VOC and $NO_x$ emissions, as precursors to ozone formation, thus have the greatest impact on County air quality. Although CO is the least significant concern, the fact that CO drains toward the ocean in winter (which makes the County a source area for CO nonattainment in coastal areas) is very similar to coastal VOC and $NO_x$ sources creating County ozone problems in summer. The fact that San Bernardino County is a source area for winter pollution problems requires that efforts to minimize CO emissions need to be as aggressive as summer VOC and $NO_x$ controls if the County is not to be a source of somebody else's poor air quality in winter just as the County is a receptor of coastal corridor air pollution in summer. While the following discussion stresses the ozone problem in the County from spring through fall, the relative importance of other pollutants in other seasons should not be ignored.

Ozone impedes breathing, destroys vegetation, rots rubber, oxidizes paint and is thus the primary component of the negative effects associated with smog episodes in inland valleys of the Basin. Ozone levels exceed the national hourly standard from March to November with "smog episodes" possible from April to October. Violations of the standard are harmful to the most sensitive receptors while episode levels are potentially harmful to all people exposed to such levels. While June to August are the smoggiest months, ozone peaks occur in May or September. The annual peaks are associated with strong inversions, high temperatures, and weak Santa Ana conditions where ozone precursors are carried seaward for several days, and then reverse onshore as the onshore winds are again established. This recirculation of aged pollutants first seaward and then onshore leads to the ozone "spikes" seen in late spring and early fall.

Because ozone formation is a function of emissions density as well as solar intensity, areas of the County along the western boundary have their ozone peak somewhat earlier than central County or mountain communities. Maximum ozone levels in Upland occur about one hour before downtown San Bernardino, which is about another hour earlier than in mountain communities. The primary time period of concern for ozone exposure is from about 10 a.m. to 6 p.m. As the basinwide precursor emissions centroid shifts eastward over time, the timing of the ozone peak also shifts slightly because the travel and reaction distance is shortened. It also moves the Basin ozone "hot spot" farther east as it has moved from downtown Los Angeles in the 1950s to Pasadena in the 1960s to Azusa in the 1970s to the western County boundary in the 1980s and to San Bernardino County in the 1990s.

Other criteria pollutants, especially those that result from a combination of direct emissions plus atmospheric processes, have somewhat different seasonal patterns. Particulate levels rise in the summer as the ozone formation process generates secondary fine particulate and the trapping inversion aloft puts a lid on the Basin. They continue to rise further into the fall, however, as six months of negligible rain creates a dust buildup on roadways and any soil disturbance creates dust clouds due to soil dryness. It is not until the first rains of late fall that there is a dramatic drop in dust/haze when visibility dramatically increases. With weak winter inversions, little photochemical activity, and a cleansing action from rainfall, winter and early spring are the most dust free periods.

Ozone, and to some extent particulate levels, are governed by the regional "marine-subsidence" inversion covering the Basin at around 1,500 feet above the surface. CO and $NO_x$, however, are more impacted by low-level nocturnal radiation inversions. These inversions are shallow and form mainly on winter nights with light winds. The monthly CO peaks and the corresponding $NO_x$ distribution reflect the importance of local trapping action on seasonal air quality. The relatively unpolluted air draining down off the San Bernardino Mountains creates a low pollution baseline such that the localized addition of CO and $NO_x$ to the airstream still allow for attainment of AAQS for these species. Hourly CO levels are seen to peak near their allowable 8-hour standard while $NO_2$ levels remain well below the State standard. Control of CO and $NO_x$ has more of a benefit to coastal communities as the baseline continues to increase when air from San Bernardino County drains westward during the night during cooler months. The indirect benefit of better controlling winter CO and $NO_x$ emissions on a basinwide scale is that it will also control summer VOC and $NO_x$ emissions when these pollutants critically affect County ozone levels.

Emissions control during the warmer months (and perhaps also the time of day as a control factor) needs to occur on a total regional basis because of the unique combination of summer winds and the inversion. An idealized wind pattern during the mid-morning hours in summer ("smog season" -- when pollutants are released that will convert to ozone in the early afternoon) would show four primary wind trajectories moving from off coast to inland. One should not conclude that emissions from Long Beach will always end up in San Bernardino, but there is a strong spatial relationship between emissions reduction in one part of the Basin and air quality improvement in a downwind receptor area. Emissions reductions in the Santa Monica Bay most benefit the downtown area or the eastern San Fernando Valley, pollutants from the South Bay end up in the western San Gabriel Valley, and those from Orange County end up mainly in Riverside County. The emissions from southern through eastern Los Angeles County and far northern Orange County are those most likely to create observed San Bernardino County ozone patterns.

The reaction rate in converting VOC and $NO_x$ to ozone varies for the several hundred VOC species participating in the photochemical smog formation process. The fastest reactions under maximum ultra-violet intensity can occur in less than an hour while slower reactions under lower sun angles can take many hours. As an average, two to four hours in the ambient air is a reasonable range in which the pollution transformation occurs. One can then look along the upwind trajectory of air coming into a given receptor site and determine the area of maximum impact/benefit in terms of any location-specific or time-specific strategies to reduce VOC and $NO_x$ ozone-formation precursors. Such an analysis was performed for the Ontario area as representative of a western County receptor and for downtown San Bernardino as a central County exposure location. Airflow maps from the South Coast AQMD were used to determine the source area for air arriving at 10 a.m., noon, 2, 4 and 6 p.m. at these two locations. These ten (10) back-trajectory maps are incorporated as an Appendix to the *Regional Air Quality Plan.*

The maps show the general location of the air for up to ten hours before it arrives at the two receptor locations. The general conclusion is that air arriving during mid-morning has been meandering around far eastern Los Angeles and far western San Bernardino County all night long, but that the airflow becomes progressively stronger and better organized by noon to 2 p.m. at the peak of the daily smog curve. The general conclusion that should be drawn from these plots is that Upland/Ontario is impacted almost exclusively from sources outside the County in the two to four hours of transit and conversion. Downtown San Bernardino does have some source areas within the far western County that may contribute to ozone formation around noon in the four hours since release around Ontario, but emissions within the County itself are really moderately important to summer ozone levels only when they reach the far eastern portion of the part of the County within the AQMD, and to some extent the mountain communities at Gregory, Arrowhead or Big Bear Lake.

An important consideration of these plots is that a westward morning commute by County residents from the rapidly developing Upland/Cucamonga/Fontana area releases those emissions squarely into the airflow blowing back across the County, especially if the emissions are exacerbated by congestion which causes VOC emissions per mile of travel to substantially increase. It would be better to reverse the commute direction eastward so that emissions are blown out of the populated areas before they have time to react, rather than being released exactly within the air parcel that is going to be passing through the middle of the County at mid-day as smog levels are approaching a maximum. Shifting the emissions pattern simply moves the ozone problem closer to the mountains or the communities farthest east. However, the convective cells along heated mountain slopes have a much better chance of diluting the emissions to reduce the smog formation rate, plus the total population exposure index (number of people exposed times their individual ozone exposure) is significantly reduced by the smaller receptor population in the eastern communities.

In terms of actions within the County on VOC and/or $NO_x$ control that will directly benefit County residents, the Ontario/Upland area is a source area of moderate sensitivity to the downwind communities, particularly what happens in the area from around 6-10 a.m. Control actions farther east in Colton or San Bernardino have a very limited effect because the air parcel into which the precursors are released is well out of the area before the photochemical reaction process is completed. The County is, therefore, not completely at the mercy of upwind sources outside the immediate environment, but the emissions reduction benefit to County residents for the same degree of reduction is much higher for a source in Los Angeles County than for any sources within San Bernardino County itself.

That conclusion is further strengthened by the fact that San Bernardino County contributes only about 10 percent of the total Basin air pollution burden such that any ability to significantly influence emissions is limited by the fact that the County only has a small portion of the total burden with which to work. The 1985 Basin inventory developed by the SCAQMD for "1989 AQMP" showed that the relative contribution of sources within San Bernardino varies somewhat for each pollutant, but is well under 10 percent for each of the four critical species shown in MEA Table 9.3, San Bernardino County Share of 1985 Pollution Emissions in the South Coast Air Basin. The "1994 AQMP" does not disaggregate emissions by County.

MEA Table 9.3

**San Bernardino County Share of 1985 Pollution Emissions in the South Coast Air Basin**

| Pollution Species | Daily Basin Emissions (tons/day) | S.B. County Emissions (tons/day) | S.B. County Share (%) |
|---|---|---|---|
| Reactive Organic Gases | 1264.4 | 107.9 | 8.7% |
| Nitrogen Oxides | 1039.8 | 85.1 | 8.2% |
| Carbon Monoxide | 5430.1 | 409.0 | 7.5% |
| Particulate Matter | 1645.3 | 141.6 | 8.6% |

Sources: *Technical Background Report, Regional Air Quality Plan*, June 1990.

If discretionary air quality actions by jurisdictions within San Bernardino County could modify the inventory by even as much as 10 percent beyond any already mandated pollution control actions, that still only constitutes less than a one percent variation in the overall Basin distribution. Given further that the benefit of in-County action is somewhat diluted by the prevailing wind pattern compared to similar actions farther upwind, the most important benefit of an aggressive pollution reduction strategy further accelerated by the County Air Quality Element is to serve as an example to upwind source areas more than to effect any substantial change in the current County ozone environment.

As previously noted, the most critical factor in pollution control, particularly from mobile sources, is that San Bernardino County residents need to live and work in close proximity. This is especially true since the emissions from a westward morning commute blow back directly across the County during the peak smog formation hours. Although the quantity of control potential is limited, the quality of reduction can be strongly enhanced with better jobs/housing balance.

The regional air quality environment to date has been characterized by very unhealthful ozone exposure, but also by a very marked improvement in air quality, as attested to by the decrease in the violations of the national AAQS for an hourly ozone exposure and for the frequency of first stage smog alerts at Upland, San Bernardino and Lake Gregory/Crestline. The number of violations has slowly decreased, but there are still more than enough precursor emissions to create a violation on days with poor dispersion even after the various control programs to date have been implemented. The dramatic improvement has been in the episode frequency and the annual peaks. The number of first stage alerts has been cut dramatically in the County in ten years. Even so, 1-hour ozone levels monitored in Redlands since 1992 have been some of the highest found in the County and the SCAB.

There has been only one second stage episode level (1-Hour $\geq$ 0.35 ppm) since 1984 in San Bernardino County. The air quality climate, especially those episodes unhealthful for all people and not just the most sensitive, has, therefore, improved spectacularly. Projecting the episode trends forward suggests that any future second stage episodes are unlikely, and that the frequency of first stage episodes will approach zero early into the next century. Unfortunately, recent evidence has shown that chronic exposure to ozone, even at near attainment levels (0.12 ppm for one hour), may be more unhealthful than previous studies have shown.

The very rapid population growth also significantly increases the exposed population base such that the total population dose is decreasing more slowly since growth in receptors is balancing improvement in air quality. Extrapolation of the national AAQS violation trend line at the current rate of progress of about 15 fewer days of violation per decade suggests that it will take 80 years to finally reach the national ozone standard. The more stringent State standard will obviously take even longer.

The ozone attainment trend is even more discouraging in light of the emissions projections from the "1994 AQMP" for the South Coast Air Basin shown in Table 9.4, SCAB Emission Inventory Future Projections, which indicate that for all the air pollution control programs in place at the time the current AQMP was developed, the existing improvement trend for $NO_x$, $PM_{10}$ and $SO_x$ will slow and reverse itself by the year 2010. Under current conditions, the effects of growth and congestion will completely off-set any future emissions reduction benefits such that these pollutant levels in the year 2010 could be almost as high as to those in 1994 except that a much greater

number of people will be exposed. Some continued eastward shift in the pattern of exposure is predicted following the housing migration pattern, but overall ozone levels could stagnate at or near their current levels if the baseline trend continues.

| MEA Table 9.4<br>South Coast Air Basin<br>Emissions Inventory and Future Projections - Baseline Case | | Average Annual Day Emissions | | | |
|---|---|---|---|---|---|
| | | 1994[a] | 2000[b] | 2005[b] | 2010[b] |
| VOC | Stationary Sources | 514 | 563 | 617 | 654 |
| | On-Road Mobile Sources | 560 | 366 | 265 | 202 |
| | Off-Road Mobile Sources | 142 | 139 | 146 | 151 |
| | Total All Sources | 1216 | 1068 | 1028 | 1007 |
| CO | Stationary Sources | 122 | 134 | 147 | 155 |
| | On-Road Mobile Sources | 4131 | 2626 | 1962 | 1678 |
| | Off-Road Mobile Sources | 1396 | 1560 | 1665 | 1749 |
| | Total All Sources | 5649 | 4320 | 3774 | 3582 |
| $NO^x$ | Stationary Sources | 207 | 127 | 114 | 107 |
| | On-Road Mobile Sources | 657 | 558 | 533 | 532 |
| | Off-Road Mobile Sources | 338 | 386 | 419 | 450 |
| | Total All Sources | 1202 | 1071 | 1066 | 1089 |
| $PM_{10}$ | Stationary Sources | 770 | 867 | 913 | 951 |
| | On-Road Mobile Sources | 61 | 62 | 65 | 69 |
| | Off-Road Mobile Sources | 21 | 23 | 25 | 27 |
| | Total All Sources | 852 | 952 | 1003 | 1047 |
| $SO^x$ | Stationary Sources | 42 | 32 | 30 | 33 |
| | On-Road Mobile Sources | 23 | 13 | 14 | 15 |
| | Off-Road Mobile Sources | 53 | 60 | 64 | 69 |
| | Total All Sources | 118 | 105 | 108 | 117 |

[a] Source: SCAQMD, 1994 AQMP Draft Appendix III-A - Current and Future Average Annual Day Emissions in the SCAB.
[b] Source: SCAQMD, "1994 Air Quality Management Plan", April 1994, Tables 3-6A, 3-7A and 3-8A, p. 3-12, 3-13 and 3-14.

A detailed analysis of the relationship between County and Basin pollution emissions is shown in a sequence of "pie charts" in Appendix B of the *Regional Air Quality Plan*. The major conclusion of this analysis is that the 200+ percent increase in VMT in San Bernardino County under the baseline assumption leads to the County being a greater contributor to the overall burden, but only by a few percent, from slightly under 10 percent to slightly over 10 percent in two decades of continued growth.

In order to isolate where the most substantial changes in the baseline can be effected, the spatial distribution of emissions was analyzed in some detail. The overall baseline pattern of current and future emissions in San Bernardino County was plotted for all source distributions (point, area and line sources) for VOC, $NO_x$ and CO for 1985, 2000, 2010. $PM_{10}$ plots are not available. These distributions are shown in Appendix C of the *Regional Air Quality Plan*. As with the overall inventory, they show a reduction from 1985 to 2000, and an emissions increase beyond 2000 that erases all previous gains. The spatial patterns show that currently there are two major emissions areas centered on the Ontario and San Bernardino/Colton areas, but that projected future growth in the Rancho Cucamonga/Fontana/Rialto area will blend these two emissions centroids into a single large source area. As previously noted, the zone of maximum, but limited, emissions sensitivity for County residents is along the western border of the County. Since this is a "hot" zone throughout the 20-year projection period, any locally "fine tuned" emissions control efforts should certainly concentrate on the I-10 Corridor in the Ontario area as the zone of maximum potential benefit.

To further identify possible areas of emissions reduction potential, the source distribution was further analyzed to identify those "major" pollution sources under AQMD permit over which any locally initiated discretionary action would likely have little effect. Of the approximately 1,000 major pollution sources in the South Coast AQMD (emitters of more than 10 tons/year of any pollutant), 67 are located in San Bernardino County. A tabular summary and spatial plot for each pollutant is shown in Appendix D of the *Regional Air Quality Plan*. The point source plots generally mirror the gridded data of centroids in Ontario and Colton/San Bernardino, except that there is also a concentration of emissions in the Etiwanda/I-15 Corridor area from some heavy industry, the power plant, etc. When the average daily emissions from the major sources are compared to the estimated 1990 County inventory, the fact that only a limited percentage of emissions are from major sources is readily seen, as shown in MEA Table 9.5, San Bernardino County Major Pollutant Sources as Shares of 1990 Pollutant Emissions.

**MEA Table 9.5**
**San Bernardino County**
**Major Pollutant Sources as Shares of 1990 Pollutant Emissions**

| Pollutant | Major Sources (tons/day) | All Sources (tons/day) | Major Source Share of Total |
|---|---|---|---|
| VOC | 12.26 | 107.7 | 11.4% |
| $NO_x$ | 18.00 | 89.2 | 20.2% |
| CO | 14.37 | 417.5 | 3.4% |
| $PM_{10}$ | 1.83 | 160.4 | 1.1% |

Source: *Technical Background Report, Regional Air Quality Plan,* June 1990.

A very significant fraction of County emissions are obviously due to on-road vehicles and small pollution sources that may be amenable to selective reduction either through mandatory AQMP measures not related to these major sources or from local discretionary actions.

## AQMP Implementation

Although the basinwide air quality distribution is somewhat sensitive to the VOC to $NO_x$ ratio in terms of ozone reaction rates, the general finding of the "1994 AQMP" air quality modeling is that basinwide VOC and $NO_x$ emissions must be reduced to around 300 tons/day and 250 tons/day , respectively, or less in order to attain the federal one-hour ozone standard. That represents approximately a 75-80 percent reduction from 1994 levels while

simultaneously off-setting emissions increases from an anticipated major population increase within the next 20 years. Population growth in the Basin is projected by SCAG to average 1.5 percent per annum from 1990 to 2010 and will almost exactly cancel any emissions reduction benefits from air pollution control programs in place prior to the adoption of the AQMP.

The "Regional Air Quality Plan" demonstrates that there will be a significant increase in San Bernardino County's contribution to the regional burden in response to continued County growth, and that the emissions reductions projected for all County sources identically mirror the reduction expectations for all basinwide sources. County emissions sources have neither been targeted for any unusually aggressive reduction strategies, nor are they expected to lag behind any other portion of the Basin. These data do not take into account emissions contributions from County residents in other areas of the Basin because of longer commuting patterns. These commute patterns are associated with jobs/housing imbalance exacerbated by heavy residential growth in western San Bernardino County without corresponding employment growth. Countywide growth is thus not only reflected in the County's share of the regional pollution burden but also to some extent in the overall regional inventory which tends to somewhat reduce the significance of County land use patterns in the overall air quality perspective.

The pattern of projected County growth and associated distribution of pollutant sources also creates some measurable differences in the anticipated spatial distribution in emissions reductions within the County itself. For example, the Chino area, which will benefit markedly from anticipated alternate disposal of agricultural waste (especially cattle manure), will experience a greater reduction of VOCs than the Ontario or San Bernardino areas where anticipated growth and certain stationary sources will continue to create some uncontrollable level of VOCs. The San Bernardino VOC projections include a component from Norton Air Force Base whose closure was not programmed into the AQMP projections made well before the base closure was announced. Such changes are an important reason why an on-going update process is undertaken to incorporate any such changes and to track the progress of the various AQMP measures in terms of effectiveness and implementation schedule.

Future ozone precursor emissions will continue to be concentrated in the Ontario and San Bernardino "hot spots," but with significantly reduced levels. Redlands is among the lowest of those communities listed at all three tier levels, for both VOC and $NO_x$. The ultimate anticipated replacement of the fossil-fueled internal combustion engine as the prime mover of all transportation sources will accentuate the role of aircraft sources which will likely not be amenable to full control, and those industrial sources using reactive materials or using fossil-fueled energy sources. Until that replacement occurs, however, mobile source emissions reduction strategies must be the major emphasis in any effective pollution control program, especially through any discretionary actions influenced by implementation of local air quality policies.

Even very small emissions reductions beyond those projected by full AQMP implementation will have a measurable impact on any one community's contribution to the overall emissions burden. A continuing awareness at the local level of the air emissions originating within a given jurisdiction is, therefore, important. To a large extent, unhealthful air quality in San Bernardino County is due to imported pollution, exacerbated by exported travel because of jobs/housing imbalance. The AQMP implementation emissions data show, however, that any positive emissions reduction steps that can be taken at the local level beyond those mandated in the AQMP can have a very substantial effect on future air quality as even the smallest reduction increments become larger and larger fractions of the regional emissions distribution.

### Conclusions on Air Quality Priorities for San Bernardino County

Air quality ignores jurisdictional boundaries, consequently air quality must be tackled on a regional basis. However, this does not preclude tailoring solutions to the problem based on local circumstances. This is certainly the case in the San Bernardino County portion of the South Coast Air Basin.

Air quality in the Basin as a whole is characterized by high levels of Ozone (O3), Carbon Monoxide (CO), Nitrogen Dioxide ($NO_2$) and 10-micron diameter respirable particulate matter ($PM_{10}$). San Bernardino County, which has some of the worst "smog" episodes in the country is in attainment with national standards for two of those four criteria pollutants, CO and NO2.

To improve air quality in the County, local government should set its highest priority on reducing Ozone, and next highest on reducing particulate matter (PM10).

San Bernardino County is responsible for less than ten percent of Basin emissions. And even in future years when the growth in the County outpaces the growth in western counties, the County's proportionate share of total emissions will be small. The source areas for the two pollutants impacting the County the most, especially ozone, but also $PM_{10}$, lie to the west. However, the County is not entirely defenseless.

The County's residents commute by the tens of thousands to employment sites in Los Angeles and Orange counties, most of their emissions being measured in those counties rather than in their "home" county. They travel and release pollutants into an emission's plume which travels eastward during the "smog" season and hits San Bernardino County during the late morning and afternoon. One of the most important things that San Bernardino County's local governments can do is to provide employment opportunities for their residents. Minimizing the commute distance will, obviously, reduce vehicle miles travelled (VMT), but perhaps more importantly, will make alternative modes of transportation more viable.

Much like Orange and Los Angeles, San Bernardino County is also a source area. This is especially evident during the winter months when local emissions of $NO_2$ and CO travel westward, helping to create unhealthful levels of these criteria pollutants in Los Angeles and Orange Counties. Despite San Bernardino being in attainment for these pollutants, San Bernardino's local governments should work towards reducing CO and $NO_2$ emissions: as an example to western counties; because controlling CO and $NO_2$ will also help control precursors to Ozone formation during the "smog" season; and because the air quality problem requires every local government to do whatever it can to reduce emissions.

San Bernardino County's air pollution problem is largely a result of emissions from western counties. Despite lack of direct control over much of the pollution problem, the County and local governments still have a significant role to play in bringing the Basin into compliance with State and federal air quality standards.

## 9.3 Wind

Redlands, like most of San Bernardino County, is subject to periodic high winds, particularly those known as the Santa Anas, see MEA Table 9.6, San Bernardino County Significant Wind Events, 1980-1988. Named for the mountains and canyons through which they pass, these winds typically occur several times per year, often between September and December, and have been measured throughout the County at speeds approaching or exceeding 100 mph. The Santa Anas have been blamed for traffic accidents, power outages due to downed power lines, deaths due to airborne debris, wind erosion, high levels of particulate matter in the air and, perhaps most significantly, devastating fires.

The California Department of Forestry and Fire Protection has identified these winds as a critical weather element in the start and spread of uncontrolled fires. Winds supply fresh oxygen to fires, quicken their spread by carrying burning fire brands, and bending flames forward while further increasing air temperatures and dehydrating both the air and available fuels. Turbulent and erratic winds exemplified by a Santa Ana condition also hinder firefighters on the ground by causing unpredictable fire fronts and rendering the use of aircraft difficult or impossible.

Both San Bernardino County and Redlands' neighbor, the City of San Bernardino, have adopted policies to protect residents from wind hazards. While recognizing the dearth of mapped information on wind hazards, County policies provide for future mapping of high wind areas as data becomes available, adoption of protective design measures for critical, essential, and high occupancy structures, upgrading for susceptible facilities, and various measures to reduce wind-induced erosion.

The City of San Bernardino has designated the northern half of the City, adjacent to the mountains, as a High Wind Area, due to historical velocities and property damage potential. In this area, the City applies stringent conditions for the construction of buildings and public facilities, including requirements on siting of structures in sheltered areas, grouping of structures to minimize exposure and avoid wind tunnel effects, incorporation of berms, landscaping, or other elements to reduce wind exposure, and erosion control measures.

Although measurements have not been made, observers have noted that Redlands generally seems to be spared the full impacts of the Santa Anas by the buffering presence of the San Bernardino Mountains. There can be great differences in wind impacts over short distances, however, due to topographic variation, and what is true for much of the Planning Area may not be true elsewhere. In particular, undeveloped portions of the Planning Area may have been subject to less scrutiny, since observers may not be present to experience or report on wind intensities.

**MEA Table 9.6**
**San Bernardino County Significant Wind Events, 1980-1988**

| Date | MPH | Damage |
|---|---|---|
| 11/17/80 | 90 | 7 fires, 1 injured |
| 11/22/80 | 100 | 4 killed, 284 homes lost |
| 2/22/81 | 63 | Many injured, 14 homes damaged |
| 1/8/82 | 100 | Many injured, 7 homes damaged |
| 12/8/82 | 80 | Airports damaged, schools closed |
| 2/18/88 | 78 | 100,000 homes without power, 5 trucks toppled |

Source: San Bernardino County Department of Land Management, 1989.

## CLIMATE, AIR QUALITY, AND WIND, SOURCES OF FURTHER INFORMATION:

- *City of San Bernardino General Plan*, 1989.
- Cal State University, San Bernardino, Meteorology Department
- Norton Air Force Base, Public Affairs Office
- Redlands Municipal Airport
- *Regional Air Quality Plan,* San Bernardino County/Cities, March 1991.
- *San Bernardino County Background Appendix*, 1989.
- San Bernardino County Environmental Public Works Department
- *San Bernardino County General Plan,* 1989 (revised 1993).
- *San Bernardino County General Plan, FEIR,* 1989.
- South Coast Air Quality Management District, *Handbook*, revised 1987.
- *Technical Background Report, Regional Air Quality Plan*, June 1990.
- University of California Riverside Agricultural Extension

# 10.0 HISTORIC, ARCHAEOLOGIC, AND PALEONTOLOGIC RESOURCES

Redlands General Plan / MEA

# 10.0 HISTORIC, ARCHAEOLOGIC, AND PALEONTOLOGIC RESOURCES

**Summary Extract.** Redlands contains significant historic, archaeologic, and paleontologic resources. The City is noted for its Victorian and Craftsman homes and historic neighborhoods. Despite the fact that perhaps less than 10 percent of the urban area and 25 percent of the rural portions of the Planning Area have been surveyed for archaeological finds, locations of artifacts and remnants of the lives of the native Serrano and Gabrielino peoples have been identified, and landscape features reflecting Spanish presence are evident. Sediments containing valuable paleontologic resources are found in San Timoteo Canyon.

## 10.1 Historic Resources

**Redlands' Beginnings.** Most of the structures built during the early 19th century no longer exist. However, some remnants remain, including the Asistencia established by the Spanish missionaries, and the Zanja (discussed in more detail below) which is an irrigation canal constructed by the local Indians. The town began to experience significant growth after construction of an additional canal in 1881. The town was well established by the time several communities voted to incorporate as the City of Redlands in 1888. During this period, many Victorian cottages were constructed, some of which still remain in the central part of Redlands and in Lugonia.

**Residential Architecture.** Redlands soon became a destination for wealthy eastern visitors attracted by the warmer climate. Many of these people built elaborate mansions which often emulated the grand houses of Europe. The period between 1887-1913 produced a wide variety of residential architectural styles including Queen Anne, Shingle Style, Colonial Revival, Mission Revival and Craftsman. Many of these classic homes have been preserved on streets such as Olive Avenue, Highland Avenue, and Cajon Street. The Lugonia area and downtown Redlands neighborhoods contain numerous Victorian cottages which are worthy of preservation. The 1920's were boom times in southern California and resulted in a myriad of architectural styles including Spanish Colonial Revival, Colonial Revival, Tudor Revival, and Norman Revival. The most prevalent style during this period was California Mediterranean which was inspired by buildings of Spain, Italy, Colonial Mexico and early adobes of the American Southwest.

**Commercial, Public, and Institutional Buildings.** Since the City had its own brickyard in the late 19th Century, many of the downtown business buildings and many of the industrial buildings were built of brick. Many of these brick buildings built along State and Orange Streets are hidden by facades resulting from remodelling in the 1950s and 1960s. Other significant buildings constructed during this time include the A.K. Smiley Library, the First Methodist Church, and the Episcopalian, Congregationalist, and Unity Churches. An architectural style known as Beaux Arts Classicism became popular during the period between 1908-1920. This style was utilized for public buildings, railroad stations and banks. Existing examples of these buildings in Redlands are the Santa Fe Railroad Station as well as several buildings at the University of Redlands.

**Historic Preservation.** The Redlands Historic and Scenic Preservation Ordinance provides a process by which the Historic and Scenic Preservation Commission places all potential resources on a "nominated resources" list. An application to alter any structures on this list is then reviewed for historical significance thus ensuring the protection of buildings which have not been surveyed. Eight Historic Districts have been established by the City of Redlands as follows: Eureka Street Historic District - five Victorian cottages (1885-1900); West Highland Avenue Historic and Scenic District - historical homes built mostly between 1887-1914; Early Redlands Historic and Scenic District - Victorian and turn-of-the-century homes and churches; Normandie Court Historic District - eighteen "Hansel and Gretel" cottages built in 1926; East Fern Avenue Historic and Scenic District - A spectrum of architectural styles built between 1900 and 1956; Garden Hill Historic and Scenic District - an adobe house, California Mediterranean houses and other styles enhanced by significant views; La Verne Street Historic District - Victorian and early 20th century cottages; Smiley Park Neighborhood - includes Redlands Bowl, the A.K. Smiley Public Library, the Lincoln Memorial Shrine, City Hall and surrounding residential uses.

The General Plan includes a more detailed description of historic resources under GP Section 3.20, Historic and Scenic Preservation.

## 10.2 Archaeologic and Paleontologic Resources

### Prehistoric Period and European Contact

**The Serrano and Gabrielino.** Prior to the arrival of Spanish Europeans, the Redlands Planning Area is thought to have been populated for thousands of years by the Serrano and Gabrielino peoples. Although the precise details of their lives are shrouded in time, remnants of their lifeways indicate settlement and resource procurement locations at or adjacent to reliable water sources. Likely areas for finding artifacts include springs, streams such as San Timoteo Canyon Creek, Yucaipa Creek in Live Oak Canyon, tributaries and their canyons, and areas adjacent to larger water bodies, such as the bluffs, terraces, and hillsides above the Santa Ana River and Mill Creek.

In 1810, Franciscans from Mission San Gabriel came to the San Bernardino Valley, probably finding the local inhabitants living in small villages. These villages served as a core for activities such as hunting, fishing, gathering or scavenging food, quarrying, ceremonial activity, and local and regional trading.

Within a decade, Spanish influence on the native peoples was exerted through the establishment of the Guachama Mission Station, constructed southwest of the East Valley Corridor Specific Plan area, on the north side of what is now Mission Road, within what is now Loma Linda. "Guachama" was the name given to the Serranos and Gabrielinos by the Mission Fathers.

**The Zanja.** At the instigation of the missionaries, in 1820 the Serrano and Gabrielino constructed a 12-mile-long irrigation ditch, connecting the fields surrounding the Guachama Mission Station with Mill Creek, to the east. Water from this ditch, which was known as the Zanja and sometimes called "Sankee," was used for domestic purposes, as well as for irrigation of the first crops planted in the San Bernardino Valley. The Zanja is said to be the only irrigation ditch constructed and maintained by native peoples for their own use in California during the Spanish and Mexican periods of rule.

### The Archaeologic Record

**Archaeological survey.** The California Archaeological Information Center (AIC), housed in the San Bernardino County Museum, estimates that less than 10 percent of the urban area has been surveyed for archaeological finds, and perhaps 25 percent of the rural portions of the Planning Area has been surveyed. Despite the lack of systematic survey, the locations of some resources are known. These include the following: a prehistoric village and two historic refuse sites within the Southeast General Plan Amendment project area; a prehistoric site, possibly a village, at Crystal Springs and another site, badly disrupted, nearby; an artifact in the Sunrise Ranch area; and three separate prehistoric sites plus sediments containing valuable paleontologic resources in San Timoteo Canyon. To protect resources, the precise locations of these sites are available to the public only on a restricted basis. To allow a quick visual scan of potentially sensitive areas, however, the City and the AIC have prepared an Archaeological Resource Sensitivity Map at a general scale.

**Archaeological Resource Sensitivity Map.** This map was developed by the AIC in conjunction with the City of Redlands. It is intended to be used to quickly determine whether or not an application for development is located within an archaeologically sensitive area, defined as an area which may contain artifacts or human remains below the earth's surface. When an application is received, City planners check the project location. Projects found to be within a sensitive area require that the staff notify the applicant and send copies of the application to the AIC. After review, the AIC will either determine that no further action by the applicant is necessary, or indicate that the applicant should hire an outside consultant to develop an archaeological resource mitigation plan.

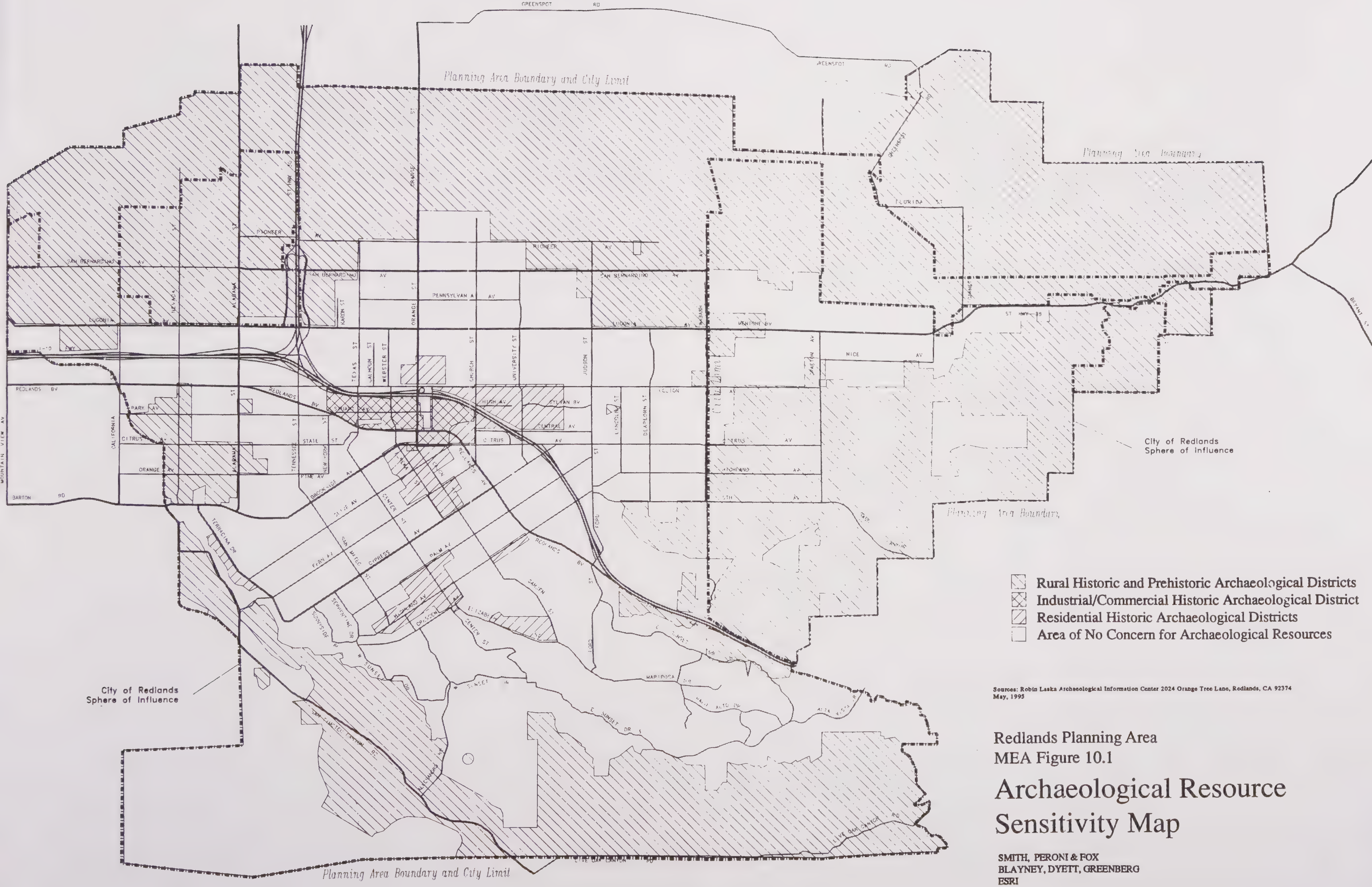
The Archaeological Resource Sensitivity Map, reproduced here as MEA Figure 10.1, Archaeological Resource Sensitivity Map, shows that most of the Santa Ana River Wash, Mill Creek, Crafton Hills, and San Timoteo and Live Oak canyons have been identified as rural historic and prehistoric archaeological districts. Rural historic is a designation oriented towards farming in the historic period. Resources found in this district may include orchards still standing, water ditches, barns, or residential and industrial buildings associated with farming activities. Prehistoric archaeological districts designate the prehistoric landscape and rural agricultural landscape that still survives. Because these areas have been insufficiently studied, archaeologists are uncertain what to expect. Historic areas and historic districts are discussed in more detail in the references listed below.

**The Paleontologic Record**

Paleontologic resources are the fossil remains or traces of past life forms, including both vertebrate and invertebrate species, as well as plants. These resources are found in geologic strata conducive to their preservation, typically sedimentary formations. As noted above, paleontologic resources have been identified in San Timoteo Canyon.

- **HISTORIC, ARCHAEOLOGIC, AND PALEONTOLOGIC RESOURCES, SOURCES OF FURTHER INFORMATION:**

  - San Bernardino County Museum and Archaeological Information Center
  - Policies contained in the Redlands Historic and Scenic Preservation Element adopted in 1985 are incorporated in or superseded by the policies in the City Design and Preservation Element, which includes a description of Redlands' history and historic architectural resources. The 1985 document contains drawings and a discussion of techniques for preservation. The Redlands Historic Preservation Design Manual, 1986, contains illustrations of architectural styles and rehabilitation principles.




Sources: Robin Laska Archaeological Information Center 2024 Orange Tree Lane, Redlands, CA 92374
May, 1995

Redlands Planning Area
MEA Figure 10.1

# Archaeological Resource Sensitivity Map

SMITH, PERONI & FOX
BLAYNEY, DYETT, GREENBERG
ESRI

# 11.0 VISUAL QUALITY

Redlands General Plan / MEA

# 11.0 VISUAL QUALITY

**Summary.** A description of a visual setting as a basis for environmental analysis must list those characteristics which make a place memorable and are subject to enhancement, degradation, or mitigation by future preservation and development decisions. Some of the distinctive landscape features or visual elements that make Redlands a memorable and desirable city to live in include: the dark green citrus trees that nearly surround the City, the arid foothills and Santa Ana River Wash, the diverse freeway views of mountains, tall palm rows and citrus groves. Also visually striking is the gradual southward rise of the Valley floor from downtown to the San Timoteo Canyon hills, the City's traditional downtown, the diagonal street pattern downtown that contrasts with the surrounding north south grid, the renowned high quality architecture, the traditional town character outside the 19th century town, the University of Redlands and citrus groves of North Redlands, and the diversity of the Mentone subdivision.

## 11.1 Visual Setting Elements

**View from above**. From the hills or from an airplane, Redlands is nearly surrounded by dark citrus green. Large groves at the perimeter of the City and remnant groves scattered within the Planning Area are present day reminders of the City's agrarian heritage.

**Arid hills and Wash**. Just beyond the citrus to the north is the Santa Ana River Wash, to the east are the rugged Yucaipa and Crafton Hills, and to the south the semi-desert Chaparral covered foothills and canyons. The contrast between nature tamed and nature raw is dramatic.

**View from the freeways**. Nearby foothills, and, on clear days, the San Bernardino Mountain range to the north, dominate the increasingly urbanized valley. The mexican fan palm rows outlining the citrus groves in the East Valley Corridor are the most striking element on the valley floor. The westbound Interstate-10 entry through Reservoir Canyon suddenly reveals a green urban oasis at the end of a long desert journey. Despite ever-diminishing views of citrus and commercial efforts to attract freeway drivers' attention, the strength of the setting overpowers urban development.

**Theater gallery**. The gradual southward rise from downtown to Sunset Drive along the San Timoteo Canyon Hills provides a "stage" for the City's center while offering north views to thousands of resident spectators and evidence of the City's residential quality to freeway travelers.

**Downtown**. Redlands retains a compact, traditional downtown based on the late 19th Century commercial center. The downtown area is easily identifiable despite loss of a portion to a somewhat suburban shopping center and a remaining redevelopment area still waiting for development. Many of the public and institutional buildings in the downtown area reflect the dignified image of Beaux Arts Classicism.

**South Redlands.** The original townsite is distinguished by it's diagonal street pattern which deviates from the north-south grid that covers the rest of the valley. This portion of Redlands contains two thirds of the City's historic architectural resources. See the documents listed at the end of MEA Section 10.2, for a description of the components of Redlands' identity as a city of outstanding architectural quality.

**Traditional town character outside the 19th Century town**. Except along Redlands Boulevard (the old transcontinental highway), Redlands has little commercial strip development. Shopping centers tend to be compact. Because of the pattern of citrus development and fragmented ownership, most residential projects have been on sites of 20 acres or less. If the Redlands' townsite had been held in parcels of several hundred acres or more until the 1970s it might have resulted in the construction of large residential tracts of little variation.

**North Redlands**. Citrus groves, the University of Redlands, and views from the Santa Ana River bluff of the San Bernardino Mountains are important assets in this sector of the City. Minimal topographic change and a uniform and large-scale street grid, have characterized parts of north Redlands.

**Mentone**. Mentone retains a small village character with great diversity of construction. Small lots, large lots, and having no two houses alike are characteristic of the original 480-acre Mentone subdivision. New residential development to the south and east is more regimented.

# 12.0 TRAFFIC

Redlands General Plan / MEA

# 12.0 TRAFFIC AND TRANSPORTATION

**Summary Extract.** The existing street network of the City of Redlands is generally a grid pattern with three significant barriers including the Interstate-10 freeway, the Santa Ana Wash and the hills/canyons in the southeastern part of the City. These natural and man-made barriers limit the quality of the circulation system. Modes of transportation in the area include automobiles, transit, bicycle, railroad and airport services. The City of Redlands does not have any existing streets that carry over 24,000 vehicles on an average day. The City of Redlands has various programmed and planned improvements for the street network to meet the requirements of the Regional Mobility Plan and Congestion Management Program.

## 12.1 Related Environmental Evaluations

The following is a summary of the Traffic Study Technical Report conducted by DKS & Associates for the City of Redlands, and which is found in the Technical Appendix at the end of this document. This report should be consulted for a detailed discussion of the information presented below.

In addition, other development proposals within the Planning Area have been analyzed and reviewed in terms of their overall impact upon the City of Redlands regarding traffic and circulation. The environmental analysis conducted for these projects have identified detailed impacts and mitigation measures necessary to reduce traffic impacts caused by these proposals. These projects have identified acceptable levels of mitigation that are consistent with the policies identified in the Redlands General Plan Traffic section,
current planning efforts being undertaken by the San Bernardino County Transportation Department and California Department of Transportation (CalTrans). The environmental documents to these projects should also be consulted for information on traffic and circulation within the Planning Area.

## 12.2 Existing Conditions

The following briefly describes the existing street system, average daily traffic, level of service (LOS), and circulation conditions for the City of Redlands. For additional detailed information regarding existing and projected traffic conditions, please refer to the technical report.

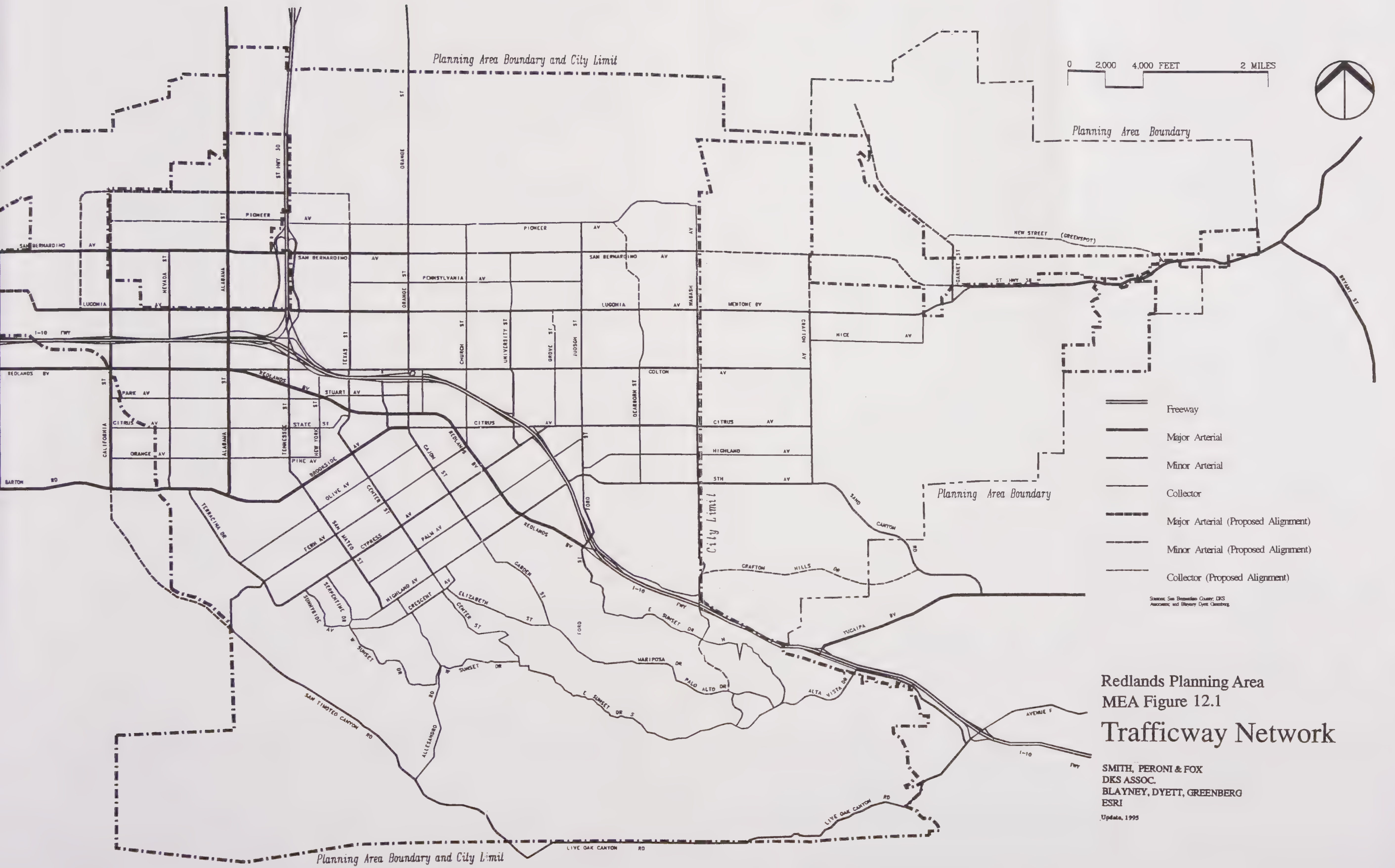
### Street System

As stated above, the existing street network of the City of Redlands is generally a grid pattern interrupted by the Interstate-10 freeway, the Santa Ana Wash and the hills/canyons in the southeastern part of the City. These natural and man-made barriers limit the quality of the circulation system.

The General Plan map designates freeways, major highways, secondary highways, collector streets, and scenic routes. Freeways, major highways and secondary highways are considered main roadways which serve the majority of traffic trips. The remaining streets are designated as either collector streets, which serve to direct traffic from residential and commercial areas to arterials, or as local streets, which provide access to adjoining land uses (see MEA Figure 12.1, Trafficway Network). These roadways are listed and further defined in more detail in the technical report.

### Daily Traffic Volumes

Average daily traffic (ADT) volumes often identify the classification of a street or denote a problem with higher volumes than expected on a certain street. Other than freeways, the City of Redlands does not have any streets that carry over 24,000 vehicles on an average day. The highest traffic volumes recorded include Alabama Street between Redlands Boulevard and Lugonia Avenue which was 24,000 ADT (Please refer to the technical report for existing and projected daily traffic volumes for other key streets within the City).




Redlands Planning Area
MEA Figure 12.1

# Trafficway Network

SMITH, PERONI & FOX
DKS ASSOC.
BLAYNEY, DYETT, GREENBERG
ESRI

Update, 1995

**Roadway Levels of Service**

Traffic flows provide an understanding of the general nature of travel in an area but do not indicate the street network's quality of service to motorists nor its ability to carry additional traffic in the future. Because of this, the concept of Level of Service (LOS) has been developed to the quality of traffic flow. As noted in the technical report, LOS grades range from A to F, with A denoting the best and F denoting the worst case scenarios. Refer to the technical report for additional information on levels of service.

**Circulation Conditions**

Generally, conditions are fairly good within the City of Redlands. Traffic can travel across the City in approximately ten minutes. There are very few locations where serious problems exist within the street system and these have been identified chiefly at the following intersections:

- Alabama Street and Redlands Boulevard
- Alabama Street and San Bernardino Avenue
- Redlands Boulevard and Orange Street

Existing traffic conditions can be improved within the Planning Area by installing traffic signals and other circulation improvements which are further discussed in the technical report.

**Transit Services**

Local and inter-city public transit services are provided by Omnitrans. Omnitrans currently has three regional lines which connect Redlands with other cities in San Bernardino County, and a fourth line circulating within the City. Omnitrans also operates five vans over ninety-eight (98) percent of Redlands to provide door-to-door service for seniors and handicapped citizens. Transit service does not appear to accommodate a large percentage of total daily or peak-hour travel in Redlands.

**Truck Routes**

The City of Redlands has adopted a truck route plan that designates certain roadways for movement of vehicles exceeding a gross weight of five (5) tons (City Resolution No.4587, December 1989). Please refer to the technical report in the appendix for specific truck routes identified within the Planning Area.

**Bicycle Routes**

Bicycle routes are classified in three categories including Class 1, Class 2 and Class 3. The only bicycle route within the City is in the vicinity of Jennie Davis Park. The City of Redlands Department of Public Works has prepared a draft Bicycle Master Plan that is being reviewed and anticipated to be adopted in early 1996. The Master Plan proposes a comprehensive network of bicycle paths to be implemented as part of the General Plan.

**Redlands Airport**

The Redlands Municipal Airport is a City-owned general aviation facility. According to the 1993 Redlands Municipal Airport Master Plan, average daily aircraft operations projected for the year 2000 were 209 compared to 186 in 1995. Conditions at the airport are further discussed in MEA Section 13, Airport Safety.

**Railroads**

Both, Atchison, Topeka, and Santa Fe (AT&SF), and Southern Pacific (SP) railroad companies operate freight lines in the Redlands area. On the average, one train on AT&SF's line makes the round trip six days a week. AT&SF has recently sold their line to Metro-Link, a commuter service train in the regional area. It is anticipated that Metro-Link will extend their commuter services to the City of Redlands. SP has a main transcontinental freight line which runs through San Timoteo Canyon to the west with an estimated average of 40 trains per day.

## 12.3 Programmed and Planned Improvements

As of 1994, the City of Redlands has various programmed and planned improvements under the Five-Year Transportation Improvement Plan which includes installing traffic signals, widening roadways and freeways, construction of new roadways, realignment of street intersections, constructing a bridge approach, and freeway planting. Please refer to the technical report for specific locations of these improvements. Funding to accomplish these improvements come from development impact fees, Measure I (sales tax) and partnership funds (SANBAG).

## 12.4 Plans and Programs

SCAG's 1993 Regional Mobility Plan serves as the Federal and State required Regional Transportation Plan, identifying policies and actions to address the region's mobility issues over the next twenty years. Projects in the region's Transportation Improvement Program must be consistent with the Regional Mobility Plan. The Plan emphasizes alternatives to freeway and street widening such as travel demand management and transit improvements. Specific programs and improvements are discussed in the traffic study technical report.

In June of 1990, Proposition 111 was passed which established requirements for each urbanized county to develop and update annually a Congestion Management Program (CMP). The intent is to address transportation needs through coordinated and comprehensive approaches. SANBAG is the agency designated to establish the CMP. Pertinent elements of the CMP are discussed in the traffic study technical report.

- **TRAFFIC SOURCES OF FURTHER INFORMATION:**

  - *City of Redlands, Public Works Department*, 1995.
  - *San Bernardino County Transportation Department, 1995.*
  - *San Bernardino County General Plan FEIR,* 1989.
  - San Bernardino County General Plan, 1989 (revised 1993).

# 13.0 AIRPORT SAFETY

Redlands General Plan / MEA

## 13.0 AIRPORT SAFETY

**Summary Extract.** The former Norton Air Force Base, located just northwest of Redlands in the City of San Bernardino, was converted to civilian use as the San Bernardino International Airport in 1994. The Redlands Municipal Airport is located in the northwest portion of the City and has safety impacts that may limit development in portions of the Planning Area. State law establishes an Airport Land Use Commission (ALUC) composed of County, City, and airport representatives to determine land use compatibility in defined aviation safety areas. The existing conditions of the Redlands Municipal Airport and the San Bernardino International Airport are described below followed by a discussion of the safety areas.

### Redlands Municipal Airport

The Redlands Municipal Airport is located in the southwestern portion of San Bernardino County, approximately two miles north and east of the center of Redlands, and approximately seven miles east of the center of the City of San Bernardino. The airport is owned and operated by the City of Redlands and is situated south of the Santa Ana Wash, between Judson Street and Wabash Avenue, adjacent to Sessums and Aviation Drive.

Redlands Municipal Airport is classified in the National Plan of Integrated Airport Systems (NPIAS) as a General Aviation airport. The Airport is designed as a General Utility airport capable of accommodating all small general aviation aircraft. The airport contains airside and landside facilities. Airside facilities are those directly associated with aircraft operations including runways, taxiways, navigational aids, and airport lighting. Landside facilities include terminal buildings, hangars, aircraft parking aprons, fuel storage areas and auto parking (See MEA Figure 13.1, Existing Airside Facilities and MEA Figure 13.2, Existing Landside Facilities).

Redlands Municipal Airport has one 4,500 foot single runway (8-26), oriented east-west, and is constructed of asphalt. Taxiways, navigational aids and lighting facilities aid pilots when landing aircraft during airport operations. In addition, airport support facilities including the terminal building, airport maintenance, aircraft rescue and fire fighting facilities, airport security, fuel facilities, and fixed base operators and aviation related industries also assist in the daily operations of the airport.

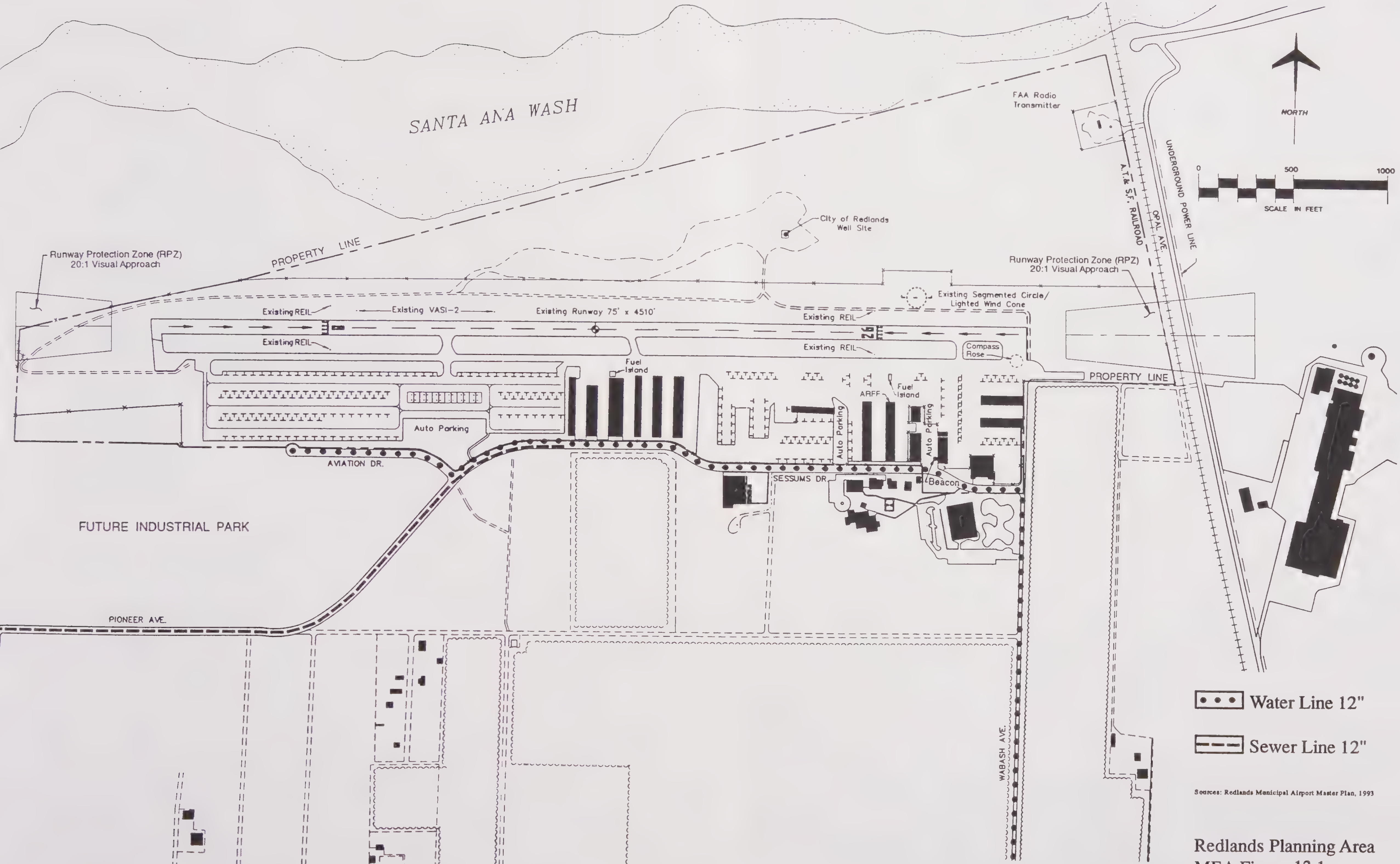
Military operations do not play a major role in the air traffic activity at Redlands Municipal Airport. Currently, military operation account for less than 0.5 percent of the total operational activity.

### San Bernardino International Airport (formerly Norton Air Force Base (AFB))

San Bernardino International Airport is located in the southeastern area of the City of San Bernardino, just north of the Santa Ana Wash. The San Bernardino International Airport was formerly Norton AFB which was an active military airport that closed in 1994. Approximately 33,400 operations were conducted at the base in 1989. Facilities at the Norton AFB included runways, taxiways, general and air carrier aviation, passenger and air cargo terminals, hangars, airport related offices, and commercial and light industrial uses.

A study in 1991 was conducted on the reuse of the AFB as a civilian commercial service airport. Civilian aviation activity at the airport have been forecast from 1995 (the first full year of civilian operation) to the year 2010, in five year increments. Total Norton service area (includes Regional Statistical Areas 29 and 30) passengers are projected to be 2.10 million in 1995.

An important issue relating to airport operations is that of safety. The Federal Aviation Administration requires that airports designate "Runway Protection Zones (RPZ)" which allow aircraft to minimize safety hazards during take-offs and landings. These zones are designated at each end of the runway and limit the

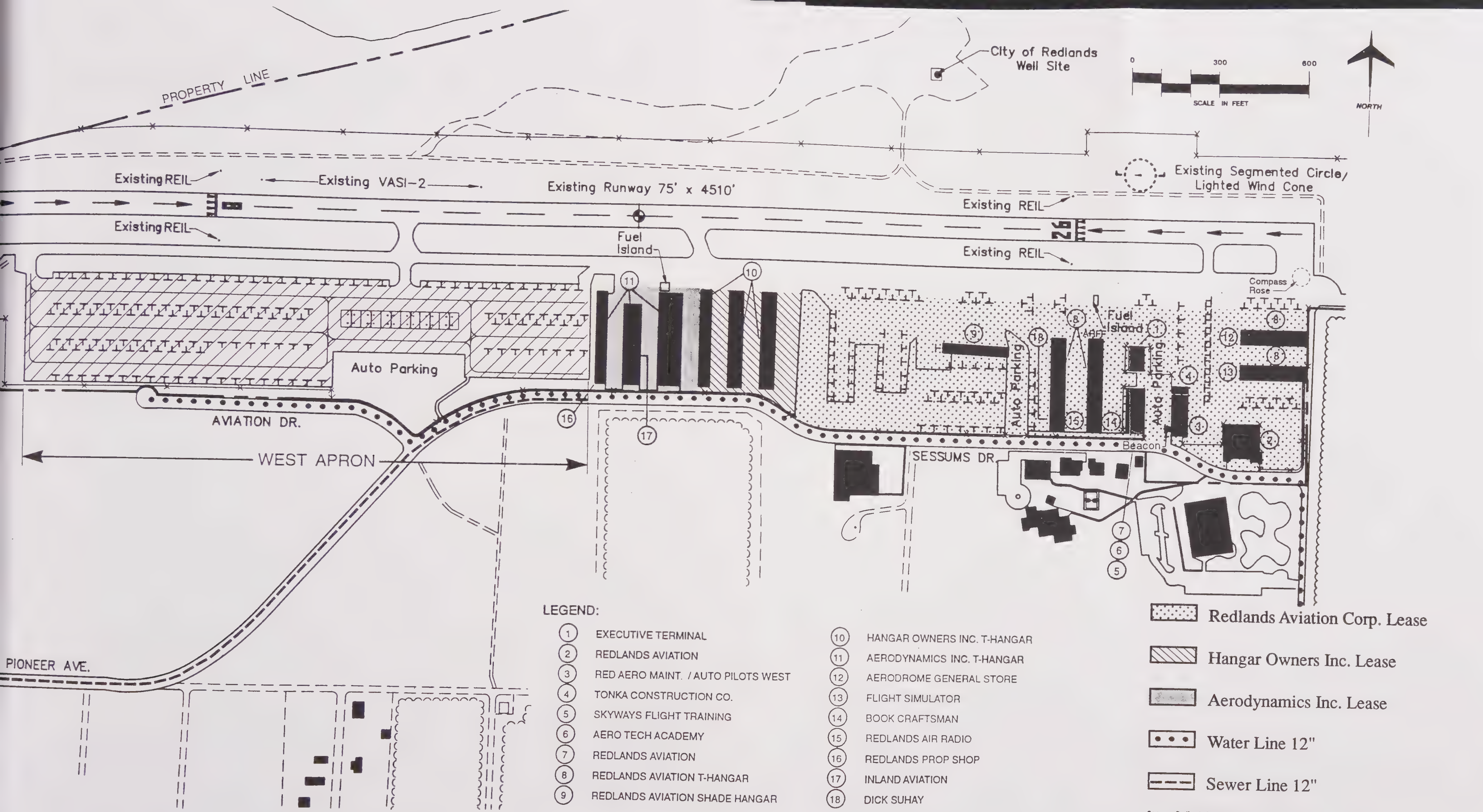



Sources: Redlands Municipal Airport Master Plan, 1993

Redlands Planning Area
MEA Figure 13.1

# Existing Airside Facilities

SMITH, PERONI & FOX
BLAYNEY, DYETT, GREENBERG
ESRI




Sources: Redlands Municipal Airport Master Plan, 1993

Redlands Planning Area
MEA Figure 13.2

## Existing Landside Facilities

SMITH, PERONI & FOX
BLAYNEY, DYETT, GREENBERG
ESRI

type of development which may occur near them. In addition to RPZ's, airport safety areas have been designated and are consistent with the Aviation Safety Component of the *San Bernardino County General Plan* (adopted 1989, revised 1993) and are defined within the Redlands Planning Area. These are as follows:

**Safety Areas**

Safety areas are established in the vicinity of airports to minimize hazards to life and property both in the air and on the ground. Consistent with the Aviation Safety Component of the San Bernardino County General Plan (adopted 1989, revised 1993), three Airport Safety Areas are defined within the Redlands Planning Area:

**Safety Area 1:** Clear zones or crash hazard zones are defined by the Federal Aviation Agency (FAA) or military AICUZ studies. Only Redlands Airport clear zones, which are partially outside the airport boundary, are within the Planning Area. Urban development within the clear zones is unacceptable.

**Safety Area 2:** The area outside the airport boundaries within the 65 CNEL (or Ldn) noise contour line. Within Safety Area 2 residential development and places of public assembly are unacceptable, but light industry (maximum 25 employees per acre) and open recreational uses such as a golf course are normally acceptable.

**Safety Area 3:** The area one mile outside the 65 CNEL noise contour line. Development of all types is normally acceptable within Safety Area 3, but the City of Redlands requires dedication of an avigation easement (a right to fly over granted to an airport owner) as a condition of project approval.

The following describes the effects of the airport operation changes to the Redlands Municipal Airport and the San Bernardino International Airport (former Norton AFB).

**Effect of Airport Operations Changes**

Redlands prepared an update to its 1980 Master Plan for the Municipal Airport in November of 1993. The master plan recognizes the challenges inherent in providing for the future aviation needs as well as the importance of Redlands Municipal Airport to the community. In the Master Plan, the preferred airport development alternative recommends extending the runway to a length of 5,310 feet, acquiring avigation easements for future runway protection zones, constructing additional taxiways to support landside development including hangars, aprons, auto parking lots, and an aviation terminal. These facilities will meet the forecast demands of small general aviation single and twin engine aircraft through the year 2015. This change in operations at the facility may affect land uses adjacent to the airport. Although land uses including public (schools, hospitals, auditoriums) and residential areas may be affected by airport activities if they are located within the 60 or 65 CNEL noise contours, none of these uses exist within these contours as shown on the Redlands Municipal Airport Master Plan.

Norton AFB closed in 1994, but the level of intensity of future aviation use is uncertain. *Norton Air Force Base Reuse Study, Technical Report 3*, prepared by P&D Technologies for the Inland Valley Development Agency, April 1990, recommends that "restrictions on land use density should be developed in the overflight areas 10,000 feet beyond each runway end. The proposed civilian flight corridor has a final straight-in approach from the west of 5 miles and a departure to the east turning right approximately 6,000 feet from the departure end of the runway." This departure pattern is similar to the one that creates the 65 CNEL contour extending to the intersection of San Bernardino and Wabash avenues as depicted in the Air Installation Compatible Use Zone (*AICUZ) Study*, although noise contours and flight patterns have yet to be finalized.

Also included in the Norton Air Force Base Reuse Study, Technical Report 2, is an estimate of 60 and 65 CNEL aircraft noise contours forecast for the projected activity in the year 2010. Neither of these projected noise contours are within the Redlands Planning Area boundary.

The P&D Technologies recommendation appears on p. 2-2 under the heading "Aircraft Noise." The 65 CNEL contour is projected to fall outside the Redlands Planning Area boundary.

Impacts relating to noise and safety areas of the Redlands Municipal Airport are discussed in Section 14 of the EIR.

**Airport Land Use Commission (ALUC)**

In 1967, each California county having a commercial airport has been required to have an Airport Land Use Commission (ALUC) composed of seven members: two representing cities, two representing the County, two representing airport operators, and one representing the public. The ALUC law emphasized promoting orderly expansion of airports and adoption of land use measures by local public agencies to minimize exposure to excessive noise and safety hazards near airports through the preparation of Comprehensive Airport Land Use Plans (CALUPs) and review of land use proposals in the vicinity of airports.

Although an ALUC did exist in San Bernardino County for many years, legislation passed in 1993 removed the mandatory requirement for ALUCs and the County ALUC was disbanded. Consequently, no ALUC currently exists in the County. Additional legislative changes in early 1995 again modified the requirements for implementing ALUCs. In general, these changes reaffirmed the requirement for preparation of CALUPs but made the formation of an independent ALUC optional if ALUC duties were assigned to an approved alternative committee. ALUC duties would include the review and approval of CALUPs, the review and approval of ongoing revisions to CALUPs, and, in the event that a jurisdiction failed to prepare a CALUP, to review all proposed land use projects in the vicinity of a designated airport. Currently, San Bernardino County along with the majority of cities within the County (including Redlands) have indicated their intent to use the alternative committee method rather than forming an independent ALUC.

Regardless of the final implementation of ALUC duties, the City of Redlands is actively pursuing the preparation of a CALUP for the Redlands Municipal Airport, having entered into a contract for consulting services in July of 1995 for the preparation of this document.

# 14.0 NOISE

Redlands General Plan / MEA

# 14.0 NOISE

**Summary Extract.** Various acoustical scales and units of measurement have been developed and include equivalent sound levels (Leq), day-night average sound levels (Ldn) and community noise equivalent levels (CNEL's). Environmental factors such as wind direction and speed, temperature gradients, characteristics of the ground and presence of landscaping, combine to increase the typical attenuation achieved outside laboratory conditions. Air temperature and humidity seldom have a significant effect on adjacent noise contours. Harmful effects of noise which are commonly of concern include speech interference, the prevention or interruption of sleep, and hearing loss. Approximately 10 percent of the population has a very low tolerance for noise and will object to any noise not of their own making. A variety of reactions can be expected from people exposed to any given noise environment. The population as a whole can be expected to exhibit responses to changes in noise levels. Recent studies have shown that changes in long-term noise levels measured in units of Ldn or CNEL, are noticeable and are responded to by people. A detailed noise study was conducted by Endo Engineering, and is included in its entirety and should be consulted to fully understand the noise aspects of the Planning Area.

## 14.1 Fundamentals of Noise

Noise levels are measured on a logarithmic scale in decibels which are then weighted and added over a 24-hour period to reflect not only the magnitude of the sound, but also its duration, frequency, and time of occurrence. In this manner, various acoustical scales and units of measurement have been developed such as: equivalent sound levels (Leq), day-night average sound levels (Ldn) and community noise equivalent levels (CNEL's).

A-weighted decibels (dBA) approximate the subjective response of the human ear to a broad frequency noise source by discriminating against the very low and high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies which are audible to the human ear. The decibel scale has a value of 1.0 dBA at the threshold of hearing and 140 dBA at the threshold of pain. Each interval of 10 decibels indicates a sound energy ten times greater than before, which is perceived by the human ear as being roughly twice as loud. Therefore, a 1.0 decibel increase is just audible whereas a 10 decibel increase means the sound is perceived as being twice as loud as before.

Examples of the decibel level of various noise sources include the quiet rustle of leaves (10 dBA), a motion picture studio (20 dBA), a library (35 dBA), ambient noise outdoors (50 dBA), normal conversation at 5 feet (55 dBA), or a busy street at 50 feet (75 DBA).

### Noise Rating Schemes

Equivalent sound levels are not measured directly but rather calculated from sound pressure levels typically measured in A-weighted decibels (dBA). The equivalent sound level (Leq) is the constant level that, over a given time period, transmits the same amount of acoustic energy as the actual time-varying sound. Equivalent sound levels are the basis for both the Ldn and CNEL scales.

Day-night average sound levels are a measure of the cumulative noise exposure of the community. The Ldn value results from a summation of hourly Leq's over a 24-hour time period with an increased weighting factor applied to the nighttime period between 10:00 pm and 7:00 am. This noise rating scheme takes into account those subjectively more annoying noise events which occur during the normal sleeping hours.

Community noise equivalent levels (CNEL) also carry a weighting penalty for noises that occur during the nighttime hours. In addition, CNEL levels include a penalty for noise events that occur during the evening hours between 7:00 pm and 10:00 pm. Because of the weighting factors applied, CNEL values at a given location will always be larger than Ldn values, which in turn will exceed Leq values. However, CNEL values are typically within one decibel of the day-night average sound level.

**Sound Propagation**

For a "line source" of noise such as a heavily traveled roadway, the noise level drops off by a nominal value of 3.0 decibels for each doubling of distance between the noise source and noise receiver. Environmental factors such as the wind direction and speed, temperature gradients, the characteristics of the ground (hard or soft) and the air (relative humidity), the presence of grass, shrubbery, and trees, combine to increase the typical attenuation achieved outside laboratory conditions to 4.5 decibels per doubling of distance.

This is particularly true for freeways where an elevated profile, higher truck mix, or the presence of intervening buildings or topography often come into play; and where the view of a roadway is interrupted by isolated buildings, clumps of bushes, scattered trees, or the intervening ground is soft or covered with vegetation and the source or receiver is located more than three meters above the ground. It should be noted, however, that the nominal value of 3.0 DBA with doubling applies to sound propagation from a "line source" which is over the top of a barrier greater than 3 meters in height, or where there is a clear unobstructed view of the highway, the ground is hard, there are no intervening structures and the height of the line-of-sight between the noise source and the noise receiver averages more than 3 meters above the ground.

In an area which is relatively flat and free of barriers, the sound level resulting from a single "point source" of noise drops by 6 decibels for each doubling of distance or 20 decibels for each factor of ten in distance. This applies to fixed noise sources and mobile noise sources which are temporarily stationary such as an idling truck or other heavy duty equipment operating within a confined area (such as industrial processes). Sound propagation from a train resembles a "line source" near the railroad tracks and a point source at distances beyond three-tenths of the train length.

The noise levels adjacent to line sources such as roadways increase by 3.0 dBA with each doubling in the traffic volume (provided that the speed and truck mix do not change). From the mathematical expression relating increases in the number of noise sources (motor vehicles) to the increase in the adjacent noise level, it can be shown that a 26 percent increase in the traffic volume will cause a 1.0 dBA increase in adjacent noise levels. Doubling the number of vehicles on a given route increases the adjacent noise levels by 3.0 dBA, but changing the vehicle speed has an even more dramatic effect.

Air temperature and humidity seldom have a significant effect on adjacent noise contours. Temperature gradients can bend or reflect noise back down to earth (usually at distances exceeding one-half mile). Wind speed and wind direction have an effect on the noise levels, but the effects are not consistent. Sound traveling with the wind is bent down to earth and sound traveling against the wind is bent upwards above the earth. Although irregular, turbulent or gusty winds cause fluctuations in sound transmissions, standard noise modeling practice does not account for any of these factors in steady state noise control.

Atmospheric effects seldom have any significant effect on noise levels at the relatively short distances from the highway to the adjacent residents. Although in some instances short duration intermittent or temporary atmospheric effects can be significant, these are not taken into account for steady-state noise control. Moreover, any small effect created by these factors would be masked by larger variations due to topography, ground absorption, vehicular speed, and roadway alignment. For example, variations in humidity can change the actual distance to a particular noise contour by as much as 6 feet, if it is located through computer modelling 800 feet from the roadway.

## 14.2 Harmful Effects of Noise

Noise can cause temporary physical and psychological responses in humans. Temporary physical reactions to passing noises range from a startle reflex to constriction in peripheral blood vessels, the secretion of saliva and gastric juices, and changes in heart rate, breathing patterns, the chemical composition of the blood and urine, the dilation of the pupils of the eye, visual acuity and equilibrium. The chronic recurrence of these physical reactions has been shown to aggravate headaches, cause fatigue, digestive disorders, heart disease, circulatory and equilibrium disorders. Moreover, as a source of stress, noise is a causal factor in stress-related ailments such as ulcers, high blood pressure and anxiety.

Three harmful effects of noise which are commonly of concern include speech interference, the prevention or interruption of sleep, and hearing loss. Excessive background noises can reduce the amount and quality of verbal exchange and thereby impact education, family life-styles, occupational efficiency, and the quality of recreation and leisure time. Speech interference begins to occur at about 40 to 45 decibels and becomes severe at about 60 decibels. Background noise levels affect performance and learning processes through distraction, reduced accuracy, increased fatigue, annoyance and irritability, and the inability to concentrate ( particularly when complex tasks are involved or in schools where younger children exhibit imprecise speech patterns and short concentration spans).

Several factors determine whether or not a particular noise event will interfere with or prevent sleep. These factors include the noise level and characteristics, the stage of sleep, the individual's age and motivation to waken. Ill or elderly people are particularly susceptible to noise-induced sleep interference, which can occur when intruding noise levels exceed the typical 35-45 decibel background noise level in bedrooms. Sleep prevention can occur when intruding noise levels exceed 50 dBA.

Hearing loss, which may begin to occur at 75 dBA, is one of the most harmful effects of noise on people. Approximately 20 million people in the United States currently have some degree of hearing loss. In many of these cases, exposures to very loud, impulsive, or sustained noises caused damage to the inner ear which was substantial even before a hearing loss was actually noticed. To prevent the spread of hearing loss, a desirable goal would be to minimize the number of noise sources which expose people to sound levels above 70 decibels.

## 14.3 Community Responses to Sound

Approximately 10 percent of the population has a very low tolerance for noise and will object to any noise not of their own making. Consequently, even in the quietest environment, some complaints will occur. Another 25 percent of the population will not complain even in very severe noise environments. Thus, a variety of reactions can be expected from people exposed to any given noise environment.

Despite this variability in behavior on an individual level, the population as a whole can be expected to exhibit the following responses to changes in noise levels: an increase or decrease of 1.0 dBA cannot be perceived except in carefully controlled laboratory experiments; a 3.0 dBA increase is considered just noticeable outside of the laboratory; an increase of 5.0 dBA is often necessary before any noticeable change in community response (i.e. complaints) would be expected.

Community responses to noise may range from registering a complaint by telephone or letter, to initiating court action, depending upon each individual's susceptibility to noise and personal attitudes about noise. Several factors are related to the level of community annoyance including: (1) fear associated with the noise producing activities; (2) socio-economic status and educational level of the residents; (3) resident conviction that they are being fairly treated; (4) attitudes regarding the usefulness of the noise producing activity; and (5) resident belief that the noise source can be controlled.

Recent studies have shown that changes in long-term noise levels measured in units of Ldn or CNEL, are noticeable and are responded to by people. About 10 percent of the people exposed to traffic noise of 60 Ldn will report being highly annoyed with the noise, and each increase of one Ldn is associated with approximately 2 percent more people being highly annoyed. When traffic noise exceeds 60 Ldn or aircraft noise exceeds 55 Ldn, people begin complaining. Group or legal actions to stop the noise should be expected to begin at traffic noise levels near 70 Ldn and aircraft noise levels near 65 Ldn.

## 14.4 Land Use Compatibility with Noise

As ambient noise levels affect the perceived amenity or livability of a development, so too can the mismanagement of noise impacts impair the economic health and growth potential of a community by reducing the area's desirability as a place to live, shop and work. For this reason, land use compatibility with the noise environment is an important consideration in the planning and design process.

Some land uses are more tolerant of noise than others. For example, schools, hospitals, churches and residences are more sensitive to noise intrusion than commercial or industrial activities. MEA Figure 14.1 is a land use compatibility chart for community noise which has been included in the California Department of Health Services document *Guidelines For the Preparation and Content of the Noise Element of the General Plan* (Revised 1987). It diagrammatically identifies noise levels for various land use types. As shown therein, single family and multi-family homes are "normally acceptable" in exterior noise environments up to 60 CNEL and "conditionally acceptable" up to 65 CNEL. Schools, libraries, hospitals, convalescent facilities, and churches are "normally acceptable" up to 70 CNEL. Industrial uses are "normally acceptable" up to 75 CNEL, as are office buildings and business, commercial, and professional uses.

A "conditionally acceptable" designation implies that new construction or development should be undertaken only after a detailed analysis of the noise reduction requirements for each land use type is made and needed noise insulation features are incorporated in the design. By comparison, a "normally acceptable" designation indicates that conventional construction can occur with no special noise reduction requirements. Currently adopted land use compatibility guidelines and noise standards for the City of Redlands are included in the Appendix of the Noise Element Technical Background Study.

## 14.5 Existing Traffic Noise Levels

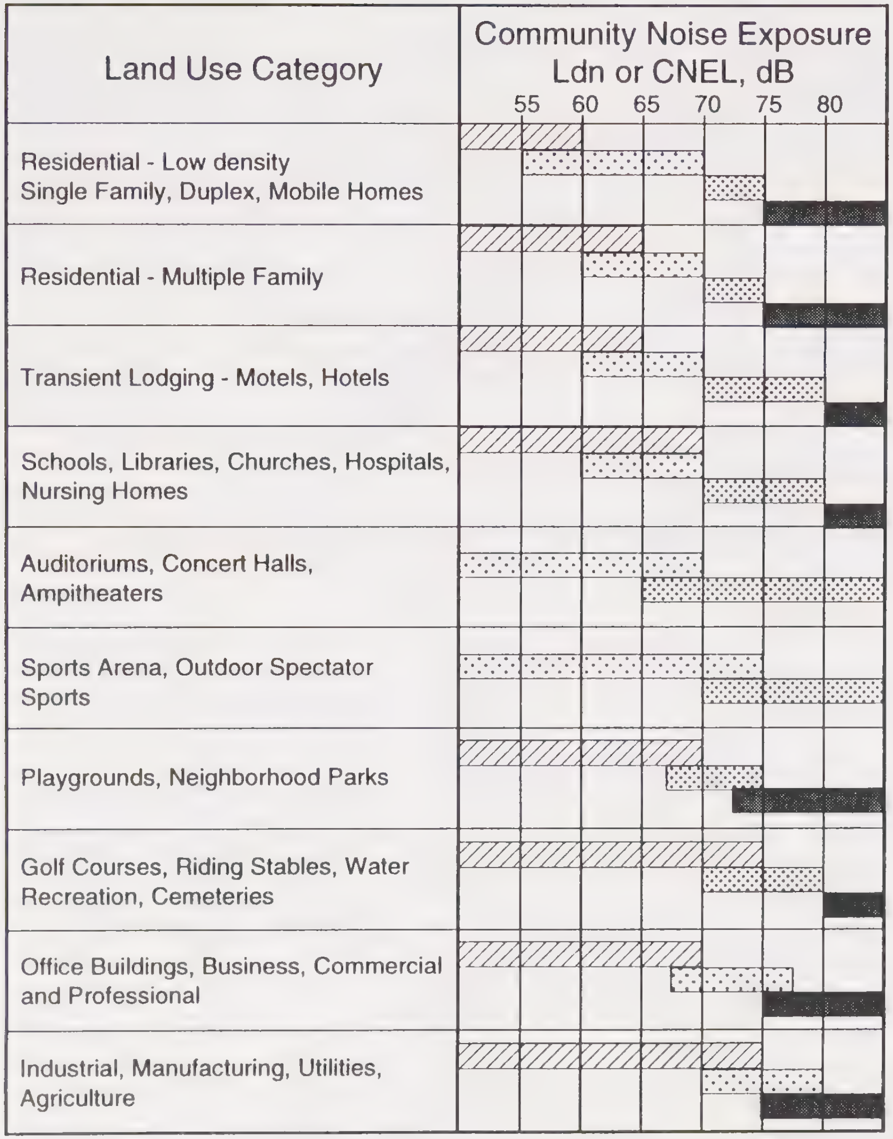
Noise from motor vehicles is generated by the engine vibrations, the interaction between the tires and the road, and the exhaust system. Reducing the speed of motor vehicles reduces the noise exposure of listeners inside the vehicle and those adjacent to the roadway.

The Highway Traffic Noise Prediction Model developed by the Federal Highway Administration (RD-77-108) and currently being applied throughout the nation was used to evaluate current noise conditions in the City of Redlands. This model accepts various parameters including: the traffic volume, vehicle mix and speed, and roadway geometry, in computing equivalent noise levels during typical daytime, evening and nighttime hours. The resultant hourly noise levels are weighted, summed over 24 hours, and output as the CNEL value. Various CNEL contours are subsequently located through a series of computerized iterations designed to isolate the 60, 65, and 70 CNEL contour locations for planning purposes.

Table 14.1, Land Use Compatability for Community Noise Environments, provides the current noise levels adjacent to roadways within the City of Redlands, while MEA Figure 4.2, shows Existing Noise Contours. The existing noise levels at 100 feet range from a low of 53.1 CNEL along Palmetto to a high of 79.4 CNEL along Interstate 10. Roadway volumes and lane geometrics were provided by DKS Associates. Noise levels were determined at 100 feet from the centerline of each roadway. The assumptions utilized for noise modeling purposes are provided in the Appendix in the Appendix of the Noise Element Technical Background Study.

# MEA Figure 14.1

## Land Use Compatibility for Community Noise Environments




### Interpretation

**Normally Acceptable**

Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements

**Conditionally Acceptable**

New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

**Normally Unacceptable**

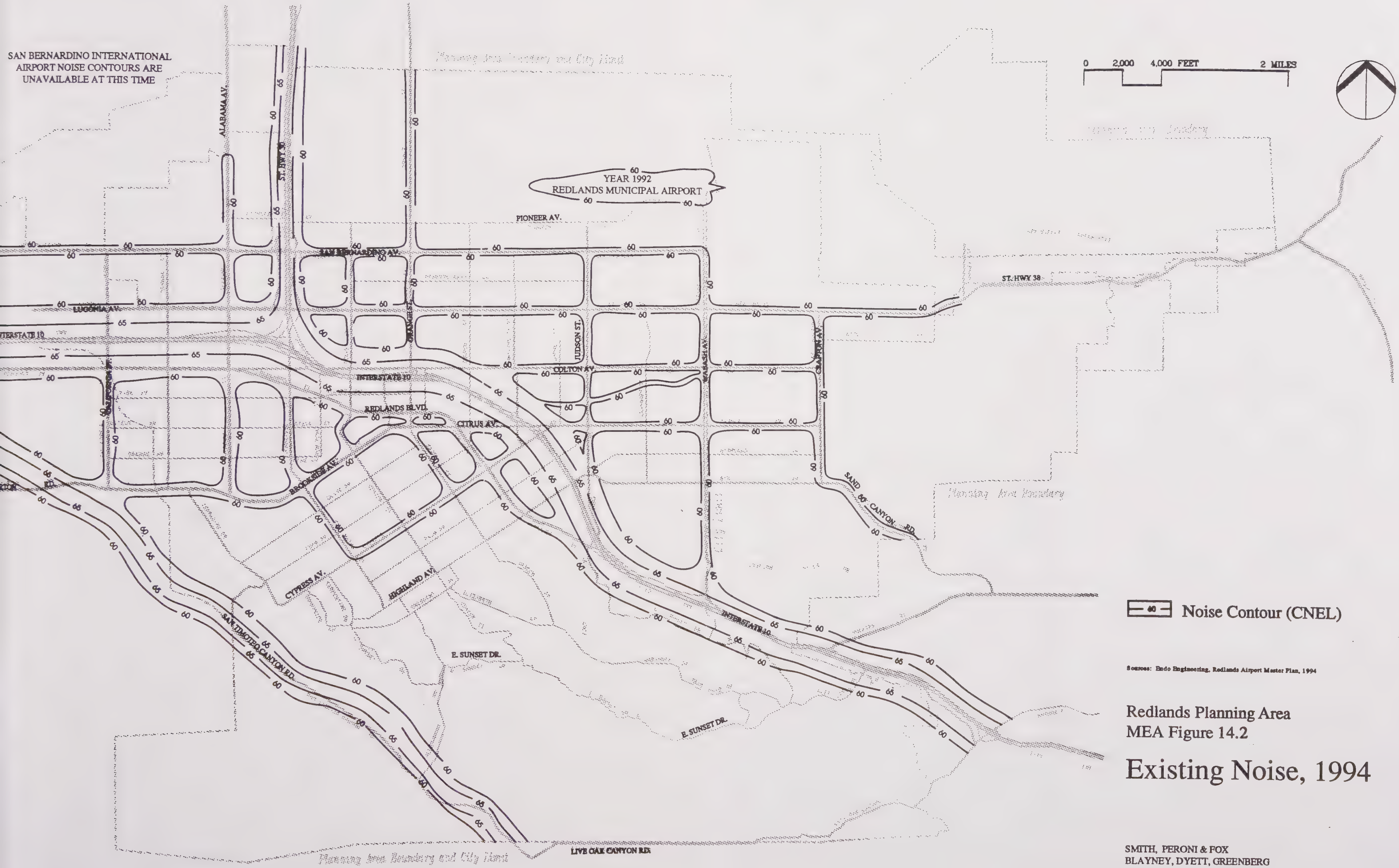
New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made with needed noise insulation features included in the design.

**Clearly Unacceptable**

New construction or development should generally not be undertaken.

*Endo Engineering*

Source: California Department of Health Services, "Guidelines for the Preparation and Content of the Noise Element of the General Plan," 1990




Redlands Planning Area
MEA Figure 14.2

# Existing Noise, 1994

**Table 14.1**
**Existing Exterior Noise Exposure**

| Roadway | A.D.T.[a] (Veh/Day) | CNEL[b] @ 100 Feet | Distance to Contours (Ft.)[c] 70 dBA | 65 dBA | 60 dBA |
|---|---|---|---|---|---|
| **Interstate 10** | | | | | |
| Mtn View-California | 138,000 | 79.4 | 352 | 752 | 1615 |
| California-Alabama | 140,000 | 79.4 | 352 | 752 | 1615 |
| Alabama-SR 30 | 140,000 | 79.4 | 352 | 752 | 1615 |
| SR 30-Orange | 130,000 | 78.7 | 318 | 675 | 1451 |
| Orange-University | 104,000 | 77.6 | 290 | 619 | 1332 |
| University-Cypress | 87,000 | 76.8 | 258 | 548 | 1178 |
| Cypress-Ford | 90,000 | 76.9 | 261 | 557 | 1196 |
| Ford-Redlands | 82,000 | 76.5 | 246 | 524 | 1125 |
| Redlands-Wabash | 87,000 | 76.8 | 258 | 548 | 1178 |
| Wabash-Yucaipa | 88,000 | 77.1 | 269 | 574 | 1234 |
| **State Route 30** | | | | | |
| I 10-San Bernardino | 46,000 | 73.2 | 158 | 334 | 717 |
| **Palmetto** | | | | | |
| California-Alabama | 1,000 | 52.1 | R/W | R/W | R/W |
| **San Bernardino Ave.** | | | | | |
| Mtn View-Alabama | 4,000 | 58.1 | R/W | R/W | 75 |
| Alabama-Orange | 8,000 | 61.8 | R/W | 61 | 132 |
| Orange-Church | 11,000 | 62.5 | R/W | 68 | 147 |
| Church-Wabash | 3,000 | 56.8 | R/W | R/W | 61 |
| Wabash-Mill Creek | 2,000 | 55.1 | R/W | R/W | 47 |
| **Lugonia Ave./Mentone Blvd.** | | | | | |
| Mtn View-Alabama | 3,000 | 56.8 | R/W | R/W | 61 |
| Alabama-Orange | 7,000 | 60.5 | R/W | R/W | 108 |
| Orange-Wabash | 12,000 | 63.0 | R/W | 75 | 157 |
| Wabash-Garnet | 8,000 | 61.2 | R/W | 58 | 120 |
| **Redlands Blvd.** | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| California-Alabama | 20,000 | 66.0 | 58 | 116 | 244 |
| Alabama-Colton | 21,000 | 66.2 | 60 | 119 | 252 |
| Colton-Texas | 19,000 | 65.7 | 56 | 111 | 234 |
| Texas-Citrus | 27,000 | 67.3 | 69 | 140 | 298 |
| Citrus-Highland | 16,000 | 65.0 | R/W | 100 | 210 |
| Highland-I 10 Fwy | 8,000 | 62.0 | R/W | 66 | 134 |
| **Colton Ave.** | | | | | |
| Sixth-University | 10,000 | 62.1 | R/W | 64 | 138 |
| University-Dearborn | 8,000 | 61.1 | R/W | 55 | 118 |
| Dearborn-Crafton | 6,000 | 59.8 | R/W | 45 | 97 |
| **Barton/Brookside/Citrus** | | | | | |
| California-Terracina | 16,000 | 65.0 | R/W | 100 | 210 |
| Terracina-Orange | 14,000 | 63.7 | R/W | 83 | 173 |
| Orange-Judson | 13,000 | 64.0 | R/W | 86 | 183 |
| Judson-Wabash | 16,000 | 64.9 | 48 | 99 | 209 |
| Wabash-Crafton | 4,000 | 58.8 | R/W | R/W | 83 |

a. A.D.T. means current average daily two-way traffic volume.
b. CNEL values are given at 100 feet from all roadway centerlines (see the Appendix for assumptions).
c. All distances are measured from the centerline. R/W means the contour falls within the right-of-way.

**Table 14.1 (Continued)**
**Existing Exterior Noise Exposure**

| Roadway | A.D.T.[a] (Veh/Day) | CNEL[b] @ 100 Feet | Distance to Contours (Ft.)[c] 70 dBA | 65 dBA | 60 dBA |
|---|---|---|---|---|---|
| **Cypress Ave.** | | | | | |
| Terracina-Citrus | 9,000 | 62.4 | R/W | 68 | 143 |
| **California St.** | | | | | |
| Palmetto-Lugonia | 1,000 | 52.1 | R/W | R/W | R/W |
| Lugonia-Redlands | 4,000 | 58.1 | R/W | R/W | 75 |
| Redlands-Barton | 7,000 | 60.5 | R/W | R/W | 108 |
| **Nevada** | | | | | |
| San Bernardino-Lugonia | 1,000 | 52.1 | R/W | R/W | R/W |
| Lugonia-Redlands | 4,000 | 58.1 | R/W | R/W | 75 |
| Redlands-Barton | 1,000 | 52.1 | R/W | R/W | R/W |
| **Alabama St./Palm** | | | | | |
| North of S. Bernardino | 11,000 | 63.4 | R/W | 80 | 165 |
| S.Bernardino-I 10 Fwy | 15,000 | 64.7 | R/W | 96 | 201 |
| I 10 Fwy-Redlands | 27,000 | 67.3 | 69 | 140 | 298 |
| Redlands-Barton | 21,000 | 66.2 | 60 | 119 | 252 |
| **Tennessee/San Mateo** | | | | | |
| Lugonia-Brookside | 14,000 | 64.3 | 45 | 90 | 191 |
| Brookside-Highland | 9,000 | 62.4 | R/W | 68 | 143 |
| **Texas/Center** | | | | | |
| Pioneer-Colton | 4,000 | 58.1 | R/W | R/W | 75 |
| Colton-Brookside | 11,000 | 63.3 | R/W | 78 | 164 |
| **Eureka St.** | | | | | |
| Pearl-Citrus | 4,000 | 58.1 | R/W | R/W | 75 |
| **Orange St./Cajon** | | | | | |
| North of Pioneer | 4,000 | 58.8 | R/W | R/W | 83 |
| Pioneer-Lugonia | 7,000 | 61.2 | R/W | 56 | 120 |
| Lugonia-I 10 Fwy | 17,000 | 64.5 | 46 | 93 | 197 |
| I 10 Fwy-Citrus | 22,000 | 65.6 | 53 | 109 | 233 |
| Citrus-Highland | 12,000 | 62.9 | R/W | 73 | 156 |
| **Judson St./Ford St.** | | | | | |
| Pioneer-Colton | 2,000 | 55.1 | R/W | R\W | 47 |
| Colton-I 10 Fwy. | 5,000 | 59.7 | R/W | 45 | 96 |
| **Wabash Ave.** | | | | | |
| Pioneer-Lugonia | 2,000 | 55.1 | R/W | R/W | 47 |
| Lugonia-Citrus | 6,000 | 59.8 | R/W | 45 | 97 |
| Citrus-I 10 Fwy. | 2,000 | 55.1 | R/W | R/W | 47 |
| **Crafton** | | | | | |
| San Bernardino-5th | 6,000 | 59.8 | R/W | 45 | 97 |

| | | | | | |
|---|---|---|---|---|---|
| **Sand Canyon** | | | | | |
| East of Crafton | 7,000 | 60.6 | R/W | 53 | 109 |
| **San Timoteo Cyn. Road** | | | | | |
| Brookside-Allesandro | 3,000 | 57.5 | R/W | R/W | 68 |

a. A.D.T. means current average daily two-way traffic volume.
b. CNEL values are given at 100 feet from all roadway centerlines (see the Appendix for assumptions).
c. All distances are measured from the centerline. R/W means the contour falls within the right-of-way.

Sensitive receptors including: hotels, motels, churches, schools, libraries, hospitals, and nursing homes are unacceptable in exterior environments which exceed 70 CNEL, as shown in MEA Figure 14.1. Single-family and multi-family residences are unacceptable in exterior environments in excess of 65 CNEL. While exterior noise levels near 70 CNEL are not necessarily desirable exposures for sensitive receptors, the 70 CNEL maximum criteria developed by the State Office of Noise Control serves as a general guideline for identifying community noise problems.

Under existing conditions, very few areas within the City experience ambient noise levels in excess of 70 CNEL, other than adjacent to the freeways. From the noise levels provided in Table 14.1, it can be seen that the 70 dBA contour falls within the right-of-way along eighty-one percent of the surface streets analyzed. Single-family and multi-family residences located within this area may experience unacceptable noise levels.

Office buildings, retail commercial areas and industrial facilities are considered normally unacceptable in exterior noise environments which exceed of 75 CNEL. From the noise contours provided in Table 14.1, it is unlikely that any areas of the City of Redlands are exposed to noise above this level as a result of motor vehicle noise.

# 15.0 COMMUNITY SERVICES

Redlands General Plan / MEA

# 15.0 COMMUNITY SERVICES

**Summary Extract.** Water, sewer, parks, schools, police, fire, emergency management, and waste management and recycling are considered in this section. These community services are provided by a variety of City departments, private companies, districts, and agencies. Provision of these community services is generally considered adequate at this time.

## 15.1 Water

Provision of water service and water supply is considered in DEIR Section 7.2, Water Supply and Conservation. The current City of Redlands *Water Master Plan* (updated 1984) provides comprehensive detail on water service. The General Plan calls for an update of the *Water Master Plan*. The following are sources of further information on water.

- **WATER, SOURCES OF FURTHER INFORMATION:**

  - City of Redlands *Water Master Plan, 1984.*
  - Bear Valley Mutual Water Company
  - Western Heights Mutual Water Company
  - San Bernardino Valley Municipal Water District
  - Metcalf and Eddy, *Draft East Valley Corridor Facilities Specific Plan,* 1988.

## 15.2 Sewer

Wastewater generated by sewered development within the Planning Area is treated at the City's plant on the south side of the Santa Ana Wash at Nevada Street. Average flow is about 6 million gallons per day (mgd), and treatment capacity is about 9 mgd. The rest of the Planning Area is served by septic systems, or not at all.

Current residential wastewater flow is 226 gallons per dwelling unit per day. However, the Redlands portion of the *East Valley Corridor Specific Plan* will add up to a total of 7.5 mgd projected in 2028.

Current wastewater flows average approximately 6 million gallons per day (mgd) with a wastewater treatment capacity of approximately 9 mgd. It is projected that by the year 2028, the City of Redlands will have a total wastewater flow of approximately 7.5 mgd (1.5 mgd increase over 33 years between 1995 and 2028). If the City of Redlands were to buildout in the year 2028, the wastewater treatment plant would have sufficient capacity. However, if the City does not buildout by the year 2028, there still remains approximately 1.5 mgd to reach capacity. If the City's wastewater treatment flows increased 1.5 mgd over a 33 year period, and 1.5 mgd remain to reach capacity, the City could accommodate additional sewage treatment for approximately another 33 years to the year 2061. At that time, if the City has not built out, plans to either expand the existing wastewater treatment plant or construct a new plant will be required.

The *Wastewater Collection System Master Plan* prepared by Camp Dresser & McKee Inc. in 1985 showed several lines where flow exceeds full pipe capacity, and several sections where flow exceeds pipe-design flow. A program of improvements is being implemented, financed by sewer-capacity improvement fees for new single-family and multifamily units, and increased user fees for current customers. The East Valley Corridor is the subject of more recent water and sewer plans prepared by Metcalf and Eddy, consulting engineers.

It is current policy to serve new development outside the City that is within the City's service area. To protect water quality, the Regional Water Quality Control Board (RWQCB) generally favors regional sewage treatment facilities rather than package treatment plants.

Until recently, the RWQCB had received few applications for package plants and it has no formal policy for determining compliance with the *Regional Water Quality Plan*. The RWQCB has no lower or upper limit for package-plant size. In the past, the RWQCB has approved a few package plants that meet certain standards for level of treatment and appropriate disposal of effluent. Because of an increase in applications to operate package plants, the RWQCB is considering developing a more comprehensive policy for evaluating applications.

Issues related to pretreatment of and standards for sewage effluent disposal are discussed further in Section 7.3, Water Quality. The following are sources of further information on sewer.

- **SEWER, SOURCES OF FURTHER INFORMATION:**
  - Camp Dresser & McKee Inc., *Wastewater Collection System Master Plan*, 1985.
  - Metcalf and Eddy, *Draft East Valley Corridor Facilities Specific Plan,* 1988.
  - John Corollo Engineers, Design Study Update Report, 1987.
  - John Corollo Engineers, Capacity Analysis, 1993.

## 15.3 Parks

Existing and future Planning Area parks are shown in the General Plan on GP Table 7.1, Existing and Proposed Parks, and existing City parks are described as follows:[1]

### Pocket Parks

**Ed Hales Park.** This is a .33-acre park located at the corner of State and Fifth streets in the downtown business district. Originally known as Central Park, it was renamed in 1982 by the City Council in memory of Ed Hales, who was the Chairman of the Planning Commission for over 30 years. A plaque is located in the Park in his memory. Ed Hales Park is a focal point for many community events, including Thursday night Market Night, parade watching, and many musical activities. The Park has a small stage area, fountains, picnic tables, and park benches.

**Lugonia Park**. This park is 2.6 acres located on the corner of Lugonia and Washington streets. It was purchased by the City in 1911 and includes two tennis courts. The Community Center and Senior Nutrition Center are located within this park, and many recreational facilities are in the Center including racquetball courts and a gymnasium.

**Franklin Park.** Franklin Park is .64 acres and is located on Garden Street and Franklin Avenue. The Boy Scouts of America donated and erected the wooden "Franklin" sign in the park many years ago. Franklin Park features many mature eucalyptus trees and a park bench.

**Simonds Parkway**. Simonds Parkway (.90 acres) is a broad, landscaped thoroughfare located across from fire station #2 on Garden Street and Rossmont Drive. James and Priscilla Simonds donated the land to the City in 1966; in 1984, they donated $30,000 to start the construction of Simonds Parkway. Mr. Frank Moore donated funds for the irrigation of Simonds Parkway. The Parkway is triangular-shaped and is densely landscaped with box trees and grass. A rock with a plaque is located in the parkway and is dedicated to James and Priscilla Simonds in recognition of their donation.

### Neighborhood Parks

**Brookside Park**. This 9.2-acre park is located on the corner of Brookside Avenue and Terracina Boulevard. The City acquired the park in 1980. The recently completed club house in the park is used for

[1] Redlands Community Services Department, 1995.

recreational programs, meetings, and snack bar use. There is a large open turf area for games and kite flying. The park has new landscaping, new playground equipment, picnic facilities and restrooms.

**Caroline Park**. In 1930, Elizabeth Phelps Stokes donated the park land to the City in memory of her sister, Caroline Phelps Stokes. The park is 16.8 acres and is located along Sunset and Mariposa drives. The park has wildflower meadows, a passive nature park, a nature study area, and hiking and horse trails. There is also a water conservation (xeriscape) demonstration garden with drought-tolerant plants and plant guides.

**Crafton Park**. The 7.5-acre Crafton Park is located on Wabash Avenue, near Crafton School. It was acquired by the City in 1978. Crafton Park has a lighted soccer field, new playground equipment, large grassy areas, snack bar, picnic facilities, and restrooms. To add to these facilities, the City recently built two sand volleyball courts in the park.

**Jennie Davis Park**. Jennie Davis Park is located in downtown Redlands on Redlands Boulevard and New York Street. Arthur and Emma Gregory donated the land to the City in 1912. This 5.2-acre park offers a peaceful setting. Large trees in the park provide shade where people can enjoy barbecues on the grills. There is also a children's playground, flower gardens and landscaping, picnic facilities and restrooms. Jennie Davis Park is the home of the "Eternal Flame" Memorial donated by the American Legion Clubs in memory of our veterans of war.

**Smiley Park.** Smiley Park is a 9.2-acre park that stretches over a four block area, from Cajon Street west to Parkwood Drive and south to Olive Avenue. Alfred Smiley donated 16 acres to the City in 1897 for a public park and library. The park surrounds City Hall and extends around the library by the Lincoln Shrine, through Redlands Bowl, and emerges as a large grassy area between Grant Street and Parkwood, with the south end bordering Olive Avenue. Free outdoor summer concerts and plays take place at the Bowl. The park area offers shuffleboard courts, horseshoe pits, picnic facilities with barbecue grills, and restrooms.

**Texonia Park.** Texonia Park is 8.7 acres in northwest Redlands on the corner of Texas Street and Lugonia Avenue. It offers a lighted basketball court and softball fields, a picnic area with barbecue grills, large lawn areas, a children's playground, and restrooms.

**Community Parks**

**Community Park**. Community Park was acquired by the City in 1964. It is 18.2 acres and is located on the corner of Church Street and San Bernardino Avenue. It has several lighted basketball and tennis courts, and soccer fields. There are picnic facilities with barbecue grills, large lawn areas, playground equipment, snack bar, and restrooms. Community Park is the home of the Baseball for Youth, Youth Soccer, and Flag Football Programs, in addition, to other competitive sports.

**Ford Park**. Ford Park is 27 acres on Redlands Boulevard and Parkford Drive. It was acquired by the City in 1965. There are recreational courts in the park, such as lighted tennis courts, paddle courts, handball courts, and volleyball courts. The park provides picnic facilities with barbecue grills, and playground equipment. Large grassy areas surround a scenic fishing pond where children under the age of 16 can fish without a license.

**Sylvan Park**. Sylvan Park is 23.3 acres at University Street and Colton Avenue. It was acquired by the City in 1911. Park facilities include: lighted volleyball courts, as well as a wading pool for children, softball field, horseshoe pits, shuffleboard courts, lawn bowling greens, and a children's playground. Along the Zanja Creek, there are large trees, paths and bridges. There are several large group picnic facilities, barbecue grills, a bandstand, and restrooms.

**Prospect Park**. Prospect Park is 24 acres on the corner of Highland Avenue and Cajon Street. It is a scenic park with mature developed trees and foliage, winding explorer trails, picturesque overlooks with benches and drinking fountains, a gazebo, and many flower gardens. There are granite cut (split face) stone retaining

walls, and orange groves throughout the park. There is a small picnic area adjacent to the Kimberly Crest Mansion and Gardens. The outdoor amphitheater in the park is the home of the Redlands Theater Festival. Prospect Park was established in 1896 by T.Y. England of Philadelphia, with advice from the Smiley Brothers. Three presidents toured the grounds which became Prospect Park in the early 1900s: William McKinley in 1901, Theodore Roosevelt in 1903, and William Howard Taft in 1909. Fred Hill purchased the park in 1930. The Friends of Prospect Park acquired the park from the Hill Heirs in 1968, and donated it to the City. A plaque was placed in Prospect Park by the Arrowhead Chapter, Daughters of the American Revolution on October 12, 1989. Horticulture and walking park guides are available at City Hall.

**Sports Complex**. The proposed Sports Complex is located on 118 acres at the northwest corner of San Bernardino Avenue and Wabash Avenue south of the Redlands Municipal Airport. The City has purchased 100 acres of land, 90 which are intended for park improvements while 10 will remain as a citrus preserve. Negotiations for the purchase of an additional 18 acres are currently in the progress. Conceptual plans for the sports park dated June 9, 1995 envision development of 9 baseball fields, 4 soccer fields, volleyball and basketball courts, a swim complex, concession buildings, tot lot/play areas, picnic facilities, a lake/irrigation reservoir, and parking for approximately 1,065 vehicles.

**Redlands Park and Open Space Plan, 1987**

Many of the proposals of this plan are incorporated in the General Plan. The golf course proposed in the Judson Street/Pioneer Avenue area is relocated on the General Plan east of Wabash Avenue to a large parcel. The Judson Street site required assembly of many small ownerships. The Judson Street/San Bernardino site is a City acquired but undeveloped park.

The General Plan does not include expanded park and recreation land within the *East Valley Corridor Specific Plan* area or at Alessandro Road and Sunset Drive.

**San Bernardino County Policies**

The San Bernardino County Regional Parks Department administers 11 regional parks. Yucaipa Regional Park is closest to Redlands. The Regional Parks Department Master Plan -- *2010 Our Parks Future* (1988) -- recommends that the Department "explore the possibility of acquiring additional parkland and open space areas, such as Little Sand or Sand Canyons. Locations identified as suitable for further investigation include the Crafton Hills, and between Sunset Drive and Live Oak Canyon Road in Redlands . . . ."

The Open Space Element of the San Bernardino County General Plan (revised August 1991) notes that "support for creation of an open space area in Crafton Hills has already been expressed by the City of Redlands and the County . . . ." The County plan also shows a proposed regional park site in San Timoteo Canyon. It could be a joint venture between the City and the County.

The *Crafton Community Planning Study* (1987) prepared for the County of San Bernardino by the Graduate Program, Department of Landscape Architecture, California State Polytechnic University, Pomona, proposes two goals for the upper Crafton Hills: establish a conservation easement and allow only appropriate recreational uses.

## 15.4 Schools

The Redlands Unified School District encompasses 147 square miles, and serves the communities of Redlands, Loma Linda, East Highlands, Mentone, Forest Falls, and a portion of San Bernardino. Seventy percent of the students in the school district reside in the Redlands and Mentone areas. The District serves grades K-12 with a present grade structure of K-6, 7-9, and 10-12. Facilities consist of 14 elementary schools, two middle schools, one comprehensive high school, and one continuation alternative high school.

The following information has been submitted by the Redlands Unified School District regarding its facility planning activities. The five-year master plan is currently under revision.

Enrollment in the Redlands Unified School District has increased 51.2 percent over the past ten years. Most of this growth occurred during the mid to late 80's, when enrollment increases averaged 5% per year. During the last several years, student growth has averaged 1.5 percent per year. Elementary student population has increased 62.2 percent, while secondary student numbers have increased 39.5 percent during the past 10 years. Currently, the largest class is the class of 2002, with 1,441 students. Current capacities and enrollments are shown in Tables 15.1, Redlands Unified School District Elementary School Capacity and Enrollment and 15.2., Redlands Unified School District Middle and High School Capacity and Enrollment

**TABLE 15.1**
**Redlands Unified School District**
**Elementary School Capacity and Enrollment[1]**

| Elementary | Perm. Capacity | Port. Capacity | YRE Capacity | Total Capacity | 90% Utilization | 1994-1995 CBEDS Enrollment |
|---|---|---|---|---|---|---|
| Crafton | 620 | 275 | 240 | 1135 | 1021 | 933 |
| Bryn Mawr*[2] | 767 | 99 | 210 | 1076 | 968 | 930 |
| Fallsvale[2] | 91 | 0 | | 91 | 82 | 80 |
| Franklin* | 883 | 0 | 240 | 1123 | 1010 | 958 |
| Kimberly | 486 | 132 | | 618 | 556 | 560 |
| Kingsbury* | 651 | 132 | 210 | 993 | 894 | 881 |
| Lugonia* | 701 | 132 | 210 | 1043 | 938 | 874 |
| Mariposa | 482 | 198 | | 680 | 612 | 604 |
| McKinley | 482 | 0 | | 482 | 434 | 434 |
| Mentone | 455 | 309 | | 764 | 687 | 606 |
| Mission-Heisner[2] | Closed | Closed | | Closed | Closed | Closed |
| Smiley* | 771 | 0 | 180 | 951 | 855 | 855 |
| Victoria*[2] | 397 | 374 | 180 | 951 | 855 | 830 |
| Arroyo Verde*[2] | 612 | 387 | 240 | 1239 | 1115 | 1,105 |
| TOTALS | 7,398.00 | 2,038.00 | 1,710.00 | 11,146.00 | 10,027.00 | 9,710.00 |

* YRS = 25% is capacity (YRS - year round school)
Source: Redlands Unified School District
[1] All data verified with RUSD staff in June and October 1995.
[2] Outside of the Planning Area

**TABLE 15.2**
**Redlands Unified School District**
**Middle and High School Capacity and Enrollment**[1]

SUMMARY: CAPACITY/ENROLLMENT

| | Perm. Capacity | Port. Capacity | P.E. Class | ** Total Cap. | 90% Utilization | 1994-95 CBEDS Enrollment |
|---|---|---|---|---|---|---|
| Middle School | | | | | | |
| 2 Cope* | 1224 | 180 | 240 | 1404 | 1263 | 1386 |
| 3 Moore* | 1144 | 210 | 240 | 1354 | 1219 | 1375 |
| TOTALS | 2368 | 390 | 480 | 2758 | 2482 | 2761 |
| TOTAL CAPACITY AT 90% UTILIZATION | | | | 2482 | | |
| High School | | | | | | |
| 1 HS Redlands* | 2420 | 616 | | 3036 | 2580 | 3365 |
| HS Redlands Freshman* | 728 | 588 | | 1316 | 1184 | 1336 |
| TOTALS | 3148 | 1204 | | 4352 | 3764 | 4701 |
| TOTAL CAPACITY AT 90% UTILIZATION | | | | 3764 | | 4231 |
| Continuation High School | | | | | | |
| 1 CH Orangewood* | 180 | 60 | | 240 | | 368 |
| TOTAL CAPACITY AT 90% UTILIZATION | | | | 216 | | |
| District Totals | | | | | | |
| Grade D-6 | 7398 | 2038 | | 11146 | | 9710 |
| Grade 7-9 | 2368 | 390 | | 2758 | | 2761 |
| Grade 10-12 | 3148 | 1204 | | 4352 | | 4701 |
| Continuation High | 180 | 60 | | 240 | | 368 |
| | 13094 | 3692 | | 18496 | | 17540 |

** Grade 7-12 Total Capacity includes Physical Education Teaching Stations.
* YRS = Year Round School
[1] All data verified with RUSD staff in June and October 1995.

Conditions of impaction exist at the elementary, middle school, and high school levels. Impaction is defined as having more students enrolled than present permanent district facilities can house, using the district's loading criteria. To accommodate new students, the school district has added 114 portable classrooms to campuses throughout the school district (92 to schools within the Redlands/Mentone area), constructed two new elementary schools (in Loma Linda and Highland), and converted ten schools to multi-track, year-round schedules.

- Portable Buildings. Portable classrooms have been installed on almost all campuses, funded, through school facility fees and the state's Emergency Portable Program. The state program makes portable classrooms available for rental, until such time as permanent facilities are constructed. Portable classrooms are moved at times from campus to campus, as needed to accommodate the student population.

**MEA TABLE 15.3**
**EXISTING AND GENERAL PLAN STUDENT GENERATION**

| | RUSD STUDENT POPULATION (student) | |
|---|---|---|
| | ELEMENTARY | SECONDARY |
| Existing 1994 (by planning sector)* | | |
| Northwest Redlands | 81 | 58 |
| North Redlands | 2481 | 1754 |
| South Redlands | 2821 | 2003 |
| West Redlands | 480 | 305 |
| San Timoteo/Live Oak Canyon | 393 | 286 |
| Crafton | 235 | 166 |
| Mentone | 506 | 357 |
| | | |
| General Plan Buildout (by planning sector)** | | |
| Northwest Redlands | 100 | 69 |
| North Redlands | 3025 | 2136 |
| South Redlands | 3237 | 2286 |
| West Redlands | 611 | 383 |
| San Timoteo/Live Oak Canyon | 955 | 694 |
| Crafton | 691 | 500 |
| Mentone | 910 | 651 |

* Reflects CBEDS 1994 enrollment of 12,209 students within Redlands/Mentone area disturbed using RUSD student generation rates and number of residential units in planning sector.

** Determined by applying RUSD student generation rates to residential units by planning sector. See EIR Table 1.2 for residential information. See EIR Table 16.2 for student generation rates.

- Construction. New school construction has been funded by school facilities fees generated from new development, matched with state funding from state-approved bond issues, through the Leroy F. Greene State School Building Program. This "50/50" program funded the construction of Arroyo Verde, Bryn Mawr Elementary Schools and land acquisition for the future Cram Elementary School and Redlands East Valley High School.

- Year-Round Schools. The capacity of a school can be increased by 25 to 30 percent, by operating on multi-track, year-round schedule. During the 1994-95 school year, 76 percent of the students in Kindergarten through sixth grade attend year-round schools, and all seventh and eighth grade students attend Cope and Moore, which operate on year-round schedules. Through the State School Building Program, the district has also applied for and obtained funding to air-condition five schools (Lugonia, Victoria, Smiley, Cope, and Crafton) needed to convert to a year-round schedule. The high schools (grades 9-12) do not utilize the year-round plan, due to difficulty in scheduling curricular and co-curricular programs and activities.

- New High School. In 1993, a local general obligation bond was approved for $34.5 million to construct a second comprehensive high school, Redlands East Valley High School. Construction is underway, and the school is scheduled for completion in 1997. This will enable the school district to operate two high schools, serving grades 9 through 12. Grades 10-12 are currently served by Redlands High School, a school originally designed for 2,300, with an enrollment of 3,300. All ninth-grade students are attending the RHS Freshman Campus as an interim measure (former Clement Junior High), until the new Redlands East Valley High School opens. Future enrollment projections will determine whether the Cope and Moore campuses will convert to traditional schedules or remain on the year-round schedule, once the new high school is open and the Clement campus is available to house middle school students.

- Alternative High School. Orangewood High School is the district's alternative high school, and currently serves over 350 students. Due to smaller class size for this program and insufficient classrooms, Orangewood operates on double sessions to accommodate its student population. The independent study program is also located at the campus.

**Historical Perspective**[2]

The Redlands Unified School District officially came into existence on July 1, 1963. It can trace its earliest origins to the first instructional class taught at the Assistencia Mission during the 1860s and the opening of the Lugonia Manual Arts School in 1877. The introduction of citrus in Redlands resulted in growth for the area's population. Similarly, the need for additional educational facilities expanded. Through the 1900s, several small schoolhouses served the entire area. Eventually these schools became part of separate and distinct elementary school districts.

As of July 1, 1963, four elementary districts served the Redlands area. They were the Redlands, Fallsvale, and Mission Elementary districts and the Yucaipa Joint Elementary District. These four elementary districts were the components of the Redlands Joint Union High School District. In the early 1960s, the State Legislature encouraged school districts to reorganize. The Legislature had concluded that there were too many school districts within the State, some being too small to be operated efficiently from both an educational and financial point of view. Consequently, many unification elections were held and the total number of districts were reduced.

[2] Updated Historical perspective from Teri Shera, Redlands Unified School District, Facilities Planning Division, 1995.

The citizens of Redlands area elected to unify within the boundaries of the Redlands Elementary School District, thus becoming the Redlands Unified School District. At the same time, Yucaipa voters chose to unify within the boundaries of the Yucaipa Joint Elementary Schools District, thus becoming the Yucaipa Joint Unified School District.

The new Redlands Unified School District consisted of the following schools and facilities:

- Redlands High School
- Redlands Junior High School
- Cope Junior High School
- Crafton Elementary School
- Cram Elementary School
- Kimberly Elementary School
- Franklin Elementary School
- Kingsbury Elementary School
- Lincoln Elementary School
- Lugonia Elementary School
- McKinley Elementary School
- Mentone Elementary School
- Smiley Elementary School
- Warehouse/Maintenance (formerly the Old Lugonia School)
- Administration (Old Lugonia School: Kindergarten and Primary Wing)
- Transportation Center

The Fallsvale and Mission districts chose not to consider unification at that time and remained separate Elementary districts. Thus the Fallsvale and Mission Elementary districts were the surviving districts of the Redlands Joint Union High School District which did not have a high school. It was necessary to elect a Redlands Union High School Board of Education and appoint a Superintendent in order to legally enter into an agreement with the Board of the new Redlands Unified School District for the education of their junior and senior high school pupils.

A Bond Election of 1963, totaling $6,500,000, greatly helped to facilitate the transition and prepare for the future. Two years after unification, Mission and Fallsvale voters elected to unify with the Redlands Unified School District. As a result, the Redlands Union High School District became defunct.

New construction of schools included Mariposa Elementary in 1964 and Moore Junior High in 1965. The new Warehouse facility was reconstructed in December 1963 due to a fire that resulted in complete loss of the original structure.

In 1967, a bond issue was passed in the amount of $6,275,000, which made it possible for the District to remodel and replace buildings considered to be unsafe in earthquakes as provided for in the Field Act. This affected the Kingsbury, Franklin, Redlands High School, and Crafton campuses.

In 1966, Lincoln School was closed in response to ethnic balance considerations. Its pupils were assigned to Mariposa, Kimberly, Kingsbury, Smiley, and McKinley Schools. Later, this site became Orangewood High School and still serves as the District's Alternative High School.

The original school building in Fallsvale was also closed in response to the Field Act of 1979 and a new facility was constructed in 1981. The new three classroom school became a reality with labor and materials donated by the Forest Falls community, and $300,000 in district funds. The California Conservation Corps also participated in the project.

In November 1990, the new Arroyo Verde School was opened in the East Highlands community and Cram Elementary School, consisting of five permanent classrooms, was closed. The original Cram site reverted to East Highlands Ranch, Inc., as part of a property exchange agreement for the Arroyo Verde site. The Cram school on Baseline was later burned down as a fire training exercise.

In 1988, the District purchased a ten-acre site in Loma Linda next to the city's future Leonard C. Bailey Park, for the Bryn Mawr Elementary School. The school opened in 1993 and is the first district school designed

to operate on a year-round schedule. The City of Loma Linda and RUSD entered into a joint use agreement to share use and responsibility for the playfield and parking lot facilities.

In March 1993, a bond issue was passed in the amount of $34.5 million for the construction of a second high school. Three previous bond elections, two in 1988 and one in 1990, were unsuccessful for this construction. The District purchased a 58-acre site on Colton and Opal Avenues for the second high school, Redlands East Valley High School, and construction is underway. The school is scheduled to be completed and open for students in the fall of 1997. The following are sources of further information on schools.

- **SCHOOLS, SOURCES OF FURTHER INFORMATION:**
  - Redlands Unified School District, *Redlands Unified School District 5-Year Master Plan*, March 1990.
  - Teri Shira, Redlands Unified School District, Facilities Planning Division, 1995.

## 15.5 Police

Police protection within the Planning Area is provided by the Redlands Police Department (within City limits), the County Sheriff's Department (unincorporated area), and the California Highway Patrol (CHP) (freeways and highways in unincorporated areas). These agencies have mutual aid agreements, ensuring inter-departmental cooperation.

**Redlands Police Department.** The Department currently has 74 sworn officers, 37 full-time non-sworn personnel, providing approximately 1 police officer and non-sworn personnel per 631 24-hour population (includes permanent residents and transients, approximately 70,000 people as estimated by Redlands Police Department). The Redlands Police Department indicates that they are currently operating at full capacity. The Chief of Police is seeking approval for a new building and an increase in staff. The Redlands Police Department has established a level of police services at a minimum of 1.3 officers per thousand 24-hour population and two non-sworn support staff per sworn officer.

**County Sheriff's Department and CHP.** The Sheriff's Department has a central station in San Bernardino. In addition to serving unincorporated portions of the Planning Area, the Department contracts with Yucaipa, Highland and Loma Linda to provide police protection. The adjacent City of Highland has proposed a new police station, to be staffed by the Sheriff's Department.

The CHP has a facility located on Western Avenue and one on Brier Road in San Bernardino. Within the Planning Area, the CHP patrols Interstate 10, State Route 30, and State Route 38. The following are sources of further information on police services.

- **POLICE, SOURCES OF FURTHER INFORMATION:**
  - California Highway Patrol
  - City of Redlands Police Department, Capt. Clete Hyman, 1995.
  - San Bernardino County Sheriff's Department

## 15.6 Fire

**Risks and requirements.** Due to a combination of topography, weather, and fuel and exacerbated by potentially high winds and limited access, portions of the Planning Area have been evaluated as being highly susceptible to fire hazards. The slopes of San Timoteo and Live Oak canyons, the Badlands, and the Crafton Hills are not only difficult for firefighters and equipment to reach, but their steepness and configuration act as natural fire hazards, and can aid in the rapid upslope spread of fire.

Limited rainfall, low humidity, and seasonal high temperatures contribute to the desiccation of the grasses and chaparral which cover the foothills, providing prime fuel for intense burns. Although some of the canyons are shielded from the direct impact of the powerful, dry Santa Ana winds, their presence generally aggravates the fire hazard. (See Section 9.0 on Climate, Air Quality, and Wind.) In addition, the presence of human activities in or near a wildland area increases the risk of a major fire dramatically.

Recent ecological research indicates that fire can play an essential role in the maintenance of ecosystems, and some species are even fire-adapted or dependent. This realization has led to programs of prescribed burning in wildland portions of the State. Controlled burns reduce fuel buildup and allow the regeneration of certain species. In areas of wildland and urban interface such as the Planning Area, however, strategies focus on prevention of fire, since the accidental uncontrolled spread of fire could lead to devastating loss of lives and property.

The risk of wildland fire can never be completely eliminated, but it can be reduced. Conceptual fire hazard areas within the City are shown on MEA Figure 15.1, Conceputal Fire Hazard Areas and have been designated by the Redlands Fire Department as being subject to palliative requirements that range from type of permissible roof materials to widths and lengths of cul-de-sacs and access streets, distances between turnouts, construction on slopes, buffers, and setbacks. The Fire Department's Roof Classification Zone map (June 1994), outlines Conceptual Fire Hazard zones where combustible roofs are prohibited.

Requirements for high fire hazard areas are specified in a document on file with the Redlands Fire Department, describing Conceptual Fire Hazard Area Fire Safety Modification Zones May 1995), and are based in part on the County Fire Hazard Overlay requirements. Additional or supplementary fire hazard mitigation measures are specified in area-specific documents.[3] These include requirements for ingress and egress, recommended fireflows, hydrant distribution, fire sprinklers, vegetative density and clearances, and other measures.

MEA Figure 15.1 shows high Conceptual fire hazard areas that have been identified within the corporate limits of Redlands and county-wide high fire hazard overlay zones in the Planning Area. The northeastern corner of the Planning Area, outside of the corporate limits, is considered subject to increased fire risks, and is classified as part of the wildland urban interface described by the San Bernardino County "Greenbelt" Fire Safety Overlay Ordinance, (July 1989 Development Code), and is subject to specific standards and requirements under this Ordinance.

**Regional fire history.** The Planning Area has been subject to numerous wildfires in the past. Perhaps the most devastating regional fire to strike in recent history was the Panorama Fire of 1980. Although outside of the Planning Area, the events could have occurred within the Redlands area. Fire conditions in late November 1980 were prime for such a disaster. It had been six months since the last rain, temperatures were much higher than normal, and the wind exceeded 75 miles per hour with gusts of up to 100 miles per hour. At the height of the conflagration the fire was totally consuming structures within 12 minutes of roof ignition. Over 180 homes were lost in one hour. A total of 325 structures were destroyed, 55 damaged. There were four deaths, 77 serious injuries, and 23,600 acres consumed. Property damage was estimated at $40 million. Fire suppression costs exceeded $6 million as 2,610 firefighters fought for one week to extinguish the fire. Losses to natural resources exceeded $12 million.[4] This fire's devastation prompted the report and recommendations of the Foothill Communities Protective Greenbelt Program.

**Methane gas.** Methane, an odorless, colorless, flammable gas, is produced as organic materials decompose, and is often detected at landfills. There are two landfills and one burnsite within the Planning Area: the California Street landfill, the Church Street Burnsite (active between the late 1920s and 1986 and now inactive),

[3] 1987 *Redlands Southeast Area General Plan Amendment FEIR* (pp. 149-153), the 1988 *East Valley Corridor Specific Plan FEIR* (pp.115-118), and the 1984 *Crafton Hills Planned Unit Development DEIR* (pp. IX-43 through IX-46, IX 76 through IX-77).

[4] San Bernardino County, *General Plan Background Appendix*, July 1989.

and the San Timoteo Canyon landfill. A landfill gas control system was installed in accordance with the requirements of the South Coast Air Quality Management District in 1993, at the City's California Street landfill, and has operated within regulatory requirements since then.

This system effectively reduces the potential of landfill-related methane fires and there have been no fires since installation of the control system.

**Fire protection services.** The City of Redlands is served by the Redlands Fire Department, and unincorporated portions of the Planning Area are served by the California Department of Forestry and Fire Protection (CDFFP), as contracted by the County of San Bernardino and headed by the County Fire Warden. Adjacent National Forest lands are served by the U.S. Forest Service.

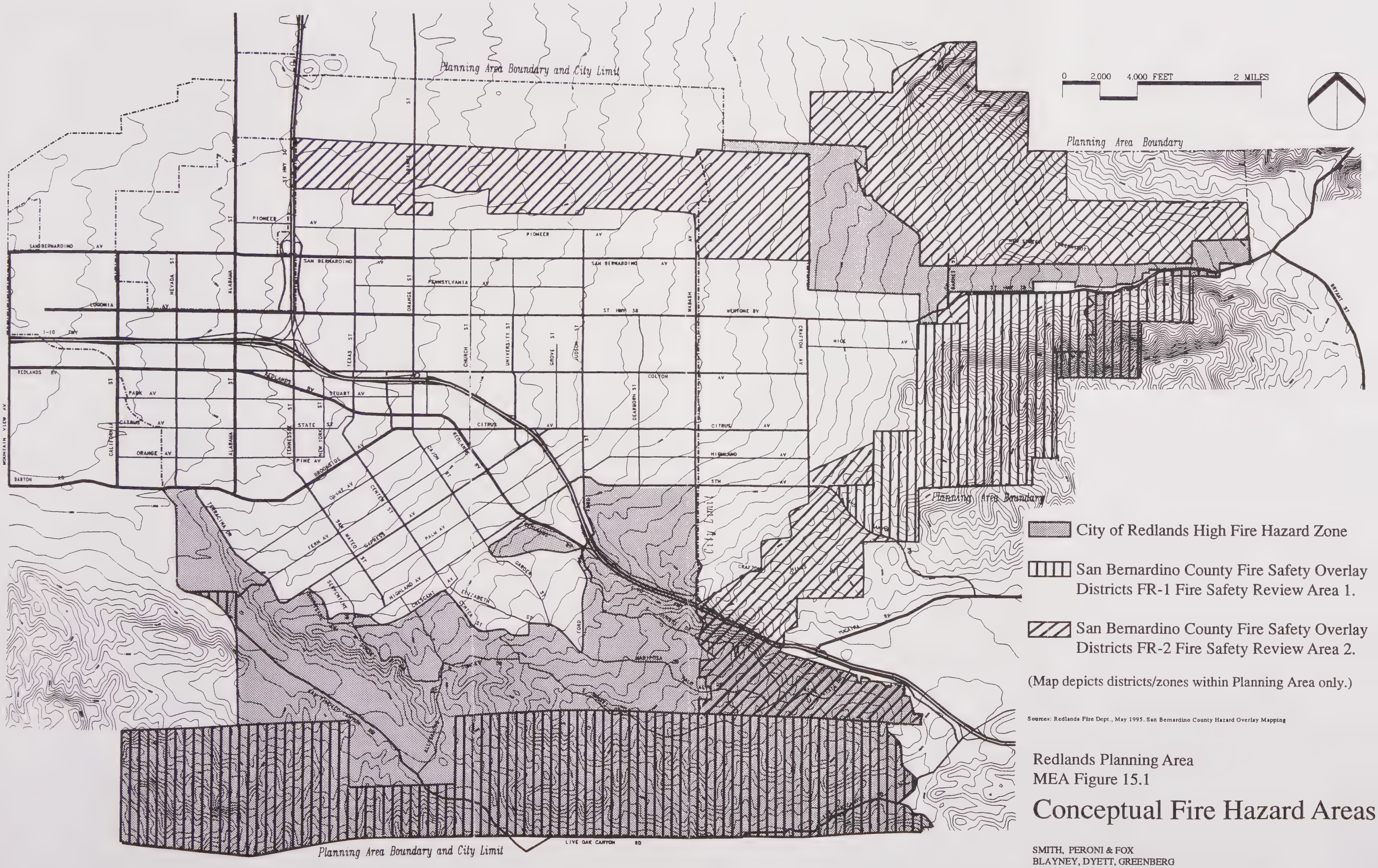
Jurisdictions within the Planning Area operate under automatic aid agreements, meaning that in an emergency the closest units are automatically dispatched, regardless of whether the emergency is within their own service area. Existing fire stations are distributed throughout and adjacent to the Planning Area, as shown in MEA Table 15.3, Redlands Area Fire Stations. Property for additional stations has been acquired, to be developed at a future date. The goal of present and future stations is to cover 75 percent of the City within a three-minute response time, 90 percent in four minutes or less, and the remaining 10 percent will vary.[5]

**MEA Table 15.3**
**REDLANDS AREA FIRE STATIONS**

| Location | Name | Status |
|---|---|---|
| 525 East Citrus Avenue | Central Station | Existing |
| 1690 Garden Street | Station No. 2 | Existing |
| 10 West Pennsylvania Avenue | Station No. 3 | Existing |
| 1300 Crafton Avenue (Mentone) | Mentone Fire Station | Existing |
| 32666 Yucaipa Boulevard (Yucaipa) | Crafton Hills Fire Station | Existing |
| Cypress Avenue at I-10 | New Central Station | Proposed |
| Barton Road west of Lakeside Avenue | Station No. 4 | Proposed |
| Southwest corner of Lugonia Avenue and Nevada Street | Station No. 5 | Proposed |

Source: City of Redlands, Fire Department Chief Enslow, 1995.

[5] URS Consultants, *East Valley Corridor Specific Plan FEIR*, 1988.




City of Redlands High Fire Hazard Zone

San Bernardino County Fire Safety Overlay Districts FR-1 Fire Safety Review Area 1.

San Bernardino County Fire Safety Overlay Districts FR-2 Fire Safety Review Area 2.

(Map depicts districts/zones within Planning Area only.)

Sources: Redlands Fire Dept., May 1995. San Bernardino County Hazard Overlay Mapping

Redlands Planning Area
MEA Figure 15.1

# Conceptual Fire Hazard Areas

SMITH, PERONI & FOX
BLAYNEY, DYETT, GREENBERG
ESRI

**Foothill Communities Protective Greenbelt Program.** In 1983, a report and recommendations on the reduction of fire, flood, and erosion losses along the wildland/urban interface in the San Bernardino Valley foothills was published as the Foothill Communities Protective Greenbelt Program (FCPGP). This multijurisdictional effort involved participants from over a dozen agencies, and resulted in the identification of Western, Central, and Eastern Interface areas subject to increased fire, flood, and erosion risks. A small portion of the Eastern Interface overlaps with the Redlands Planning Area, including the Santa Ana River Wash and the proposed Greenspot (Sunrise Ranch) development. The FCPGP was then developed into the San Bernardino County "Greenbelt" Fire Safety Overlay Ordinance (July 1989), with standards for access and traffic circulation, site and street identification, roadside vegetation specifications, water supply and system standards, construction and development design, erosion control, and several other requirements.

- **FIRE, SOURCES OF FURTHER INFORMATION:**
  - California Department of Forestry and Fire Protection
  - City of Redlands Fire Department, Fire Chief Mel Enslow and Fire Marshal Leonard Temby, 1995.
  - *Crafton Hills Planned Unit Development DEIR*, 1984.
  - *East Valley Corridor Specific Plan, FEIR*, 1988.
  - *Foothills Communities Protective Greenbelt Program*, 1983.
  - *Redlands Southeast General Plan Amendment FEIR,* 1987.
  - San Bernardino County Fire Warden, Paul Miller, 1995.
  - U.S. Forest Service, San Bernardino National Forest

## 15.7 Emergency Management

**City Emergency Disaster Plan.** The City of Redlands *Emergency Disaster Plan* is the guiding document in the event of emergencies in the Planning Area. According to the *Emergency Disaster Plan*, which is continually updated every two years, the potential for a major calamity increases with the urbanization of previously unpopulated areas, and with the advent of industrial processes using hazardous materials. The *Emergency Disaster Plan* notes that the impact of disasters such as earthquakes, fires, and floods has become magnified as more and more high-risk land in the region is developed to keep up with urban growth. In addition, the unprecedented use of hazardous chemicals in industry and agriculture increases the potential for disaster. Transportation accidents can almost instantaneously produce mass casualties. Social unrest can grow to major proportions and erupt into riots, resulting in loss of life and destruction of property.

**Background for the City Emergency Disaster Plan**

As the need for federal disaster assistance continues to grow due to losses from the disasters previously mentioned, the Federal Emergency Management Agency (FEMA) has renewed emphasis on reducing the potential for future disaster losses through the implementation of hazard mitigation programs and activities. Mitigation is also critical to state and local governments, which must bear the effects of loss of life and property when disaster occurs.

Section 409 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 (Public Law 93-288, as amended) is the basis for the involvement of state and local governments to evaluate and mitigate natural hazards as a condition of receiving Federal disaster assistance. FEMA has established rules for implementing the Section 409 requirement. These rules are described in the Code of Federal Regulations (CFR) Part 206, Subpart M. A major requirement of Subpart M is the development of a post-disaster hazard mitigation plan. This is the City's Emergency Disaster Plan.

The City's Emergency Disaster Plan provides strategies for reduction of potential losses from future natural or man made disasters. Hazard mitigation is fundamental to reducing vulnerability to disaster- related damages.

The 1991 East Bay Hills fire (Oakland, CA) prompted the adoption of Senate Bill 1841 (Government Code Section 8607, effective January 1, 1993). This statute directed the Governor's Office of Emergency Services (OES), in coordination with various state and local emergency management agencies, to establish the Standardized Emergency Management System (SEMS). The framework of SEMS includes the Incident Command System (ICS), multi-agency and interagency coordination, Master Mutual Aid Agreement and system and the operational area concept. SEMS establishes the response roles of the various agencies and the manner in which the agencies will function.

The City of Redlands participates in the SEMS system and has utilized the Multi-Hazard Functional Planning (MHFP) guidance as the basis for the emergency disaster plan.

The basic SEMS approach outlines five stages in hazard mitigation:

* Problem Identification
* Planning
* Mitigation (hazard reduction)
* Response
* Recovery

The *Emergency Disaster Plan* identifies several hazardous situations to which the City will respond. Of these, earthquake, flood, dam failure, and fire are addressed in other sections, and their impacts are intended to be minimized through implementation of General Plan policies. (See MEA Section 4.0, EIR Section 5.0 and GP Section 8.5 for earthquakes, MEA Section 6.2, EIR Section 7.0 and GP Section 8.4 for flood and dam failure, and MEA Section 15.6, EIR Section 16.6 and GP Section 8.3 for fire.) Additional calamities covered by the *Emergency Disaster Plan* include war, terrorist acts, transportation accidents, industrial accidents, civil disturbance, storms, pollution, epidemic, hazardous or radiological materials spills, major gas line ruptures, draught and extreme heat.

**Evacuation routes.** The Emergency Disaster Plan provides Planning Area specific evacuation routes. The *San Bernardino County General Plan* (1993) designates potential evacuation routes in the event of an emergency. Within the San Bernardino Valley, the major routes out of the County are Interstates 10, 15, and 215, along with State Highways 30, 31, 60, 66, 71, and numerous major and secondary highways. This list is not intended to be comprehensive, and evacuation routes would be designated during a specific emergency, since earthquakes, floods, fires, or other disasters may make certain routes impassable.

In addition to the above potential evacuation routes, Caltrans has identified a number of possible evacuation routes in the San Bernardino Valley. These roads have the least number of bridges, and may be among the safest roads to travel in the event of a major earthquake. In the East Valley, those roads which connect with the Planning Area include:

- Hospitality Drive from Tippecanoe Avenue to Waterman Avenue
- Coulston Street from Mountain View Avenue to Tippecanoe Avenue
- Lugonia Avenue from Orange Street to Mountain View Avenue
- Redlands Boulevard from Orange Street to Waterman Avenue

Routes leading away from the Planning Area and crossing through San Bernardino rely on parts of Barton Road, Waterman Avenue, Mill Street, E Street, Kendall Drive, La Cadena Drive, Mt. Vernon Avenue, Highland Avenue, and Cajon Street.

**Cooperative efforts.** In the event of an emergency, the City would, to the extent possible, coordinate efforts with San Bernardino County, surrounding jurisdictions, the State of California Office of Emergency Services, and the Federal Emergency Management Agency (FEMA). The American Red Cross and other professional volunteer organizations also provide assistance during natural disasters, operating independently of, but coordinating with, local government.

**Activation of Emergency Plan.** The City of Redlands *Emergency Disaster Plan* becomes operative automatically by the existence of a State of War Emergency as defined by the California Emergency Services Act, or when the Governor has proclaimed a State of Emergency in an area including the City, or on the orders of the City Council, in accordance with local ordinance.

- **EMERGENCY MANAGEMENT, SOURCES OF FURTHER INFORMATION:**
  - *City of Redlands Emergency Disaster Plan*, December 1995.
  - City of Redlands Fire Department, Captain Mitch McKee, 1995.
  - City of Redlands Police Department
  - *San Bernardino County General Plan,* (adopted 1989, revised 1993).

## 15.8 Waste Management and Recycling

Planners and citizens are faced with the difficult task of finding alternatives to disposal of solid waste at existing landfills (i.e., recycling, composting), and finding acceptable sites for new landfills. Many factors must be considered when siting a landfill including transport distance, cost, and proximity to residential areas and groundwater sources.

The State has passed legislation attempting to increase the prominence of source reduction and recycling. Since landfill disposal of hazardous waste generated by households creates potential groundwater concerns at municipal solid waste landfills, State legislation also addresses the proper disposal of household hazardous waste.

Assembly Bill 939 (AB 939), the California Integrated Waste Management Act of 1989, requires every City and County in the State to prepare a Source Reduction and Recycling Element (SRRE), that identifies how each jurisdiction will meet the mandatory waste diversion goals set by AB 939 of 25 percent by 1995 and 50 percent by 2000. AB 939 also requires every jurisdiction to develop a Household Hazardous Waste Element (HHWE), to plan for the proper management of hazardous wastes that are generated by households.

The City of Redlands' SRRE and HHWE were developed in response to AB 939. After review and adoption by the City, the SRRE was submitted to San Bernardino County for incorporation into the County-wide Integrated Waste Management Plan, and to the California Integrated Waste Management Board (CIWMB) for approval (approval granted in January 1995). Portions of the following paragraphs are excerpts from the revisions made to the SRRE and the HHWE prior to CIWMB approval.

**Waste Management Practices as of 1995**

In 1990, approximately 77,400 tons of waste were generated in the City of Redlands. Of these, 67,800 tons were disposed, and 9,600 tons were diverted, resulting in a diversion rate of 12.4 percent. The single largest component of the waste disposal stream is paper (42.4 percent), followed by other organics (23.3 percent), and yard waste (13.5 percent). Approximately .7 percent of the City's waste disposal stream (by weight) is estimated to be household hazardous waste.[6]

Almost all waste disposed by generators in the City is hauled by the City of Redlands Municipal Utilities Department, Solid Waste Division, as a public service. The City annexation areas are serviced by private haulers under a grandfather clause. The solid waste generated within and collected by the City is disposed of at the California Street Landfill, owned and operated by the City of Redlands. Approximately 65,000 tons of refuse per year are disposed of at the California Street Landfill, with 50 percent from residential, 42 percent from commercial, and 8 percent from industrial sources. As of October 1994, the California Street Landfill's remaining capacity was estimated to be 900,000 cubic yards, and it is projected to close in early-mid 1998. However, the City plans to apply for a permit modification to allow vertical expansion of an additional 10-15 foot lift on the present landfill. If permitted, this expansion would increase the life of the landfill approximately 1.68 million cubic yards to the year 2000. (Methane gas concerns associated with this site are addressed in MEA Section 15.6 and DEIR Section 16.6.) In addition to the waste hauled to the City's California Street Landfill, a smaller amount of waste is hauled to County landfills by residents and private companies.

As of mid 1995, the City has a curbside recycling program which provides pickup service of newspapers, aluminum cans, glass, plastics, and cardboard for 16,000 households. Yard waste is collected from 2,100 households for composting. Yard waste collection is being expanded in the Fall of 1995 to 16,000 single family residences for composting. In addition, the City has one drop-off center, three reverse vending machines, and a Citywide office paper recycling program. About 100 Redlands businesses participate in a City-sponsored office paper collection program. Cardboard recycling is provided for select businesses. Redlands also has a residential curbside collection program for Christmas trees which are ultimately composted. The City also provides support to residents for backyard composting, recycling of used appliances and free community cleanup days.

The County has been providing services related to household hazardous waste management since 1984. These services include the maintenance of permanent collection centers (one of which is in Redlands), periodic one-day collection events, a public education and outreach program, and a load-checking program at the area's County-owned landfills.

- **WASTE MANAGEMENT AND RECYCLING, SOURCES OF FURTHER INFORMATION:**

  - EMCON Associates, *City of Redlands Source Reduction and Recycling Element and Household Hazardous Waste Element*. Adopted by the City of Redlands, August 1994, Revised and Approved by the State in January 1995.
  - San Bernardino County, Department of Environmental Health Services, *San Bernardino County Hazardous Waste Management Plan,* February 1990.
  - VTN, *East Valley Sanitary Landfill Site FEIR*. Prepared for the Environmental Improvement Agency, March 1975.

[6] Valorie Shatynski, Redlands Solid Waste Manager, Public Utilities Department, 1995 (all information, Section 15.8).

# 16.0 ENERGY

Redlands General Plan / MEA

# 16.0 ENERGY

**Summary Extract.** Electrical energy is provided by the Southern California Edison Company, and natural gas is delivered by the Southern California Gas Company to the Planning Area. Service is adequate for current energy consumption. Project-specific energy conservation measures have been incorporated in past projects within the Planning Area, however there is no entitled energy conservation program in effect today.

## Utilities Facilities

**SCE Company.** SCE is connected with the Pacific Intertie grid, allowing it to import electricity from anywhere in the Western United States, if needed. Within the County, SCE operates several thermal (oil or gas-fired) generating stations, including the significant Etiwanda power plan, and, on the south side of the mountains, eight small hydroelectric power plants. The Etiwanda power plant represents approximately 10.5 percent of the total SCE generating capacity in the County, while the hydroelectric contribution is less than one percent of the total capacity.

Within the Planning Area or immediate vicinity, SCE operates one hydroelectric facility (Mill Creek No. 1), five substations (Redlands, Smiley, Mentone, Tennessee, Zanja), one steam plant (San Bernardino), several 220 kilovolt transmission lines (portions of the Devers-San Bernardino Nos. 1 and 2, San Bernardino-Vista, Etiwanda-San Bernardino, Devers-Vista Nos. 1 and 2) and the Redlands Service Center. The 220 kilovolt transmission lines run along the western edge of the Planning Area and through the southwestern corner, stretching south from the San Bernardino Steam Plant, then east of Mountain View Avenue, and turning southeast to parallel San Timoteo Canyon Road along the southern slopes of the Canyon. These facilities are shown on maps on file with the City of Redlands.

As shown in MEA Table 16.1, Existing Electricity Consumption, the estimated total existing electricity consumption within the planning area is currently 388,150,678 kWh per year.

Table 16.1
Existing Electricity Consumption

| Use | Units/Square Feet | Usage Rate | kWh/yr |
|---|---|---|---|
| Residential | 26,906 units | 5,626.5 kWh/unit/yr | 151,386,610 |
| Commercial | 3,099 ksf | 13.55 kWh/sf/yr | 41,991,450 |
| Office | 2,438 ksf | 12.95 kWh/sf/yr | 31,572,100 |
| Industrial | 3,288 ksf | 10.50 kWh/sf/yr | 34,524,000 |
| TOTAL | | | 259,474,160 |

**SCG Company.** SCG serves the majority of the County, and all of the Planning Area. Natural gas - not produced within the Redlands Planning Area - is produced in small quantities in the Chino Hills, although it is primarily imported from elsewhere in California, or from out of State.

High pressure gas lines (greater than 60 pounds) run along Mountain View Avenue on the western edge of the Planning Area, turning southeast at Mission Road. At California Street the lines jog north, continuing east and south along Orange Avenue to Tennessee Street, State Street, Eureka Street, Redlands Boulevard, Reservoir Road, Wabash Avenue, Panorama Drive, and entering Yucaipa along Hampton Road and Dunlap Boulevard. Another high pressure gas line stretches along Sand Canyon Road and Crafton Avenue. Smaller gas lines carried in pipes ranging from three to eight inches are distributed throughout most of the Planning Area. These facilities are shown on maps on file with the City of Redlands.

MEA Table 16.2, Existing Natural Gas Consumption, provides an estimate of existing natural gas consumption in the planning area. As shown in the table, uses within the planning area currently consume an estimated 2,138,707,764 cubic feet (cf) of natural gas per year.

Table 16.2
Existing Natural Gas Consumption

| Use | Units/ Square Feet | Usage Rate | Usage (c.f./mo) | Total Usage (c.f./yr) |
|---|---|---|---|---|
| Residential | | | | |
| Single-Family | 17,145 units | 6,665 c.f./unit/mo | 114,471,425 | 1,373,656,500 |
| Multi-Family | 9,731 units | 4,012 c.f./unit/mo | 39,040,772 | 468,489,264 |
| Office | 2,438 ksf | 2.0 c.f./s.f./mo | 4,876,000 | 58,512,000 |
| Commercial | 3,099 ksf | 2.9 c.f./s.f./mo | 8,987,100 | 107,845,200 |
| Industrial | 3,288 ksf | 3.3 c.f./s.f./mo | 10,850,400 | 130,204,800 |
| TOTAL | | | | 2,138,707,764 |

## Additional Potential County Energy Resources

In addition to local production of hydroelectric power and natural gas, the County relies on small amounts of locally-produced oil (from the Chino Hills area), wind (from the Newberry Springs area), and solar power (several facilities). Energy is also produced at coal-fired facilities (Colton and Victorville), biomass-fired facilities (Chino), and waste-to-energy facilities (Upland). None of these resources have been developed within the Redlands Planning Area.

## Energy Conservation

Energy conservation may also be viewed as a potential resource, since the prudent use of energy will allow greater utilization of existing resources. Conservation might include such measures as reduced demand and reduction in wasted energy, recycling, and development of new forms of energy production.

**Reduced demand and reduction in wasted energy.** Reducing demand and wasted energy may incorporate residential, commercial, and industrial educational outreach programs designed to inform the consumer about options for energy conservation. Transportation-related measures which lead to energy conservation might include urban design and land use patterns which reduce trips, minimizing fossil fuel use, and Transportation Systems Management (TSM), and Travel Demand Management (TDM) measures. A number of past environmental documents on portions of the Redlands Planning Area have additionally specified energy-reducing measures related to architectural design and project orientation. Among those documents which can be consulted for detailed recommendations are the *Crafton Hills Planned Unit Development DEIR* (1984), *Redlands Southeast General Plan Amendment FEIR* (1987), *Tentative Tract 13294 FEIR* (1988), and the East Valley Corridor Specific Plan FEIR (1988).

**Recycling.** Recycling is discussed in detail in EIR Section 16.8, Waste Management, of the Community Services Section, in the Source Reduction and Recycling Element, and in the Household Hazardous Waste Element. Recycling resources saves energy, since the recycling process tends to use less energy than primary production of resources. This is true of all resource types, from the more commonly recycled items such as glass, paper, aluminum, and tin to fossil-fuel-based resources such as plastics and automobile-related waste oils.

**New forms of energy production.** Cogeneration, waste-to-energy conversion, and development of solar or wind energy may all be possible for portions of the Redlands Planning Area. Development of cogeneration and waste-to-energy conversion might be viewed as conservation measures, since they utilize waste products which would otherwise require an input of energy for disposal. Solar or wind energy may be viewed as potentially energy conservative since the resources are "free" and unlimited, compared to nonrenewable resources, which could then be conserved for energy production in the future.

### County Energy Goals and Policies

San Bernardino County's energy-related goals and policies are specified in the Energy/Telecommunications section of the County General Plan. Energy-related goals and policies relative to the Redlands Planning Area include the County's active participation in efficient energy production and distribution, participation in the Joint Utilities Management Program, consolidation of pipeline and transmission line corridors into existing corridors or parallel to interstate freeways, review of new energy facilities and participation in the siting process including dissemination of information to the public, implementation of energy conservation practices and incentives to comply with the minimum requirements of the California State Energy Regulations, coordination with other agencies to achieve energy conservation and support for development and use of alternative energy resources and technologies, utilization of energy-efficient technologies and design in new developments, and requirements for consideration of energy in environmental review.

- **ENERGY, SOURCES OF FURTHER INFORMATION:**

  - *City of Redlands Source Reduction and Recycling Element,* 1995.
  - *Crafton Hills Planned Unit Development, DEIR,* 1984.
  - Joint Utilities Management Program
  - *Redlands Southeast General Plan Amendment FEIR,* 1987.
  - *San Bernardino County General Plan Background Appendix,* 1989.
  - *San Bernardino County General Plan, FEIR,* 1989.
  - *San Bernardino County General Plan,* 1989 (revised 1993).
  - Southern California Edison Company
  - Southern California Gas Company
  - *Tentative Tract 13294 FEIR,* 1988.
  - East Valley Corridor Specific Plan FEIR, 1988.
  - Gary G. Phelps, Municipal Utilities Director, City of Redlands

PAGE


| | | |
|---|---|---|
| 12.0 | VISUAL QUALITY | 1 |
| 12.1 | Environmental Setting | 1 |
| 12.2 | Visual Elements | 1 |
| 12.3 | Visual Quality Impacts and Mitigation Provided by Plan Policy | 1 |
| 12.4 | Additional Visual Quality Mitigation and Unmitigable Impacts | 2 |
| 12.5 | Light and Glare | 2 |
| 13.0 | TRAFFIC | 1 |
| 13.1 | Traffic and Transportation Impacts and Mitigation Provided by Plan Policies | 1 |
| 14.0 | AIRPORT SAFETY | 1 |
| 15.0 | NOISE | 1 |
| 16.0 | COMMUNITY SERVICES | 1 |
| 16.1 | Water | 1 |
| 16.2 | Sewer | 1 |
| 16.3 | Parks | 2 |
| 16.4 | Schools | 3 |
| 16.5 | Police | 5 |
| 16.6 | Fire | 5 |
| 16.7 | Emergency Management | 6 |
| 16.8 | Waste Management | 7 |
| 17.0 | ENERGY | 1 |
| 18.0 | ELECTROMAGNETIC FIELDS | 1 |
| 19.0 | ALTERNATIVES TO THE PROPOSED PROJECT | 1 |
| 19.1 | Description of Alternatives | 1 |
| 19.1.1 | Alternative #1: Proposed Project | 1 |
| 19.1.2 | Alternative #2: Existing General Plans | 2 |
| 19.1.3 | Alternative #3 No Project/No Development (1995 Conditions) | 2 |
| 19.1.4 | Alternative #4: Reduced Development | 2 |
| 19.1.5 | Alternative #5: Reduced Traffic | 3 |
| 19.2 | Conclusion and Comparison of Alternatives Matrix | 3 |
| 20.0 | CEQA TOPICS | 1 |
| 20.1 | Cumulative Impacts | 1 |
| 20.2 | Significant Unavoidable Adverse Impacts | 8 |
| 20.3 | Irreversible and Irretrievable Commitment of Resources | 8 |
| 20.4 | Growth Inducing Impacts | 9 |
| 21.0 | MONITORING AND REPORTING | 1 |
| 22.0 | REPORT PREPARATION STAFF, CONSULTANTS, AND BIBLIOGRAPHY | 1 |
| 23.0 | AGENCIES, ORGANIZATIONS AND PERSONS CONSULTED | 1 |

TECHNICAL APPENDICES

Appendix A Buildout Land Use Assumptions

Appendix B Traffic Technical Report

Appendix C Air Quality Technical Report

Appendix D Noise Element Technical Report

## 17.0 ELECTROMAGNETIC FIELDS

**Summary Extract.** Although electrical transmission lines criss-cross the City, the highest voltage lines 220 kilovolts that are under study as potential health hazards, only traverse the western edge and cross the southwestern corner of the Planning Area. Most of these lines are remote from existing housing.

**Electromagnetic fields and disease.** Electric and magnetic fields abound in nature, and emanate from the flow of electricity through everything from transmission lines to household appliances. After several years of analysis of dozens of studies exploring a possible connection between cancer and extremely low frequency (ELF) electromagnetic fields, the Environmental Protection Agency (EPA) has concluded that a growing body of data suggests a causal link. Although measurable, the intensity of electromagnetic fields is not related to any yet-established health standards, and effects on human tissue are subtle, complex, and poorly understood. Because the data suggests rather than proves a link between these fields and health risks, the EPA has not formally classified power-line electromagnetic fields as a potential carcinogen. However, some independent researchers state that cancer or other types of health risk may be associated with long-term residence close to high-voltage power lines and substations. Congressional bills that would boost Federal funds for research into the biological effects of the electromagnetic fields, including fields from power lines in residential areas are under consideration.

**Setbacks.** Transmission lines within the Planning Area range from very low voltages to those of 220 kilovolts. Southern California Edison has no official setback recommendations from these lines, since a link between power-line electromagnetic fields and deleterious health effects has not been conclusively established. Most existing power line rights-of-way are at least 50 feet wide, allowing 25 feet of buffer on each side of the transmission line corridor centerline. The width of the towers places the actual transmission line within the 25 foot buffer, meaning that units constructed at the edge of the buffer may actually be less than 25 feet from the electromagnetic field. Although unofficial, a representative of a Northern California power company notes that planning for 50 to 75 foot buffers on either side of the transmission lines would provide "good distance" between the electromagnetic fields and residential areas.

The State Department of Education, School Facilities Planning Division has established limits for locating school sites near high voltage power transmission line easements.[1] These standards may require setbacks ranging from 100 feet from the edge of an easement for a 100 kilovolt line to a 350-foot setback for a 500-550 kilovolt line. For lines greater than 550 kilovolts, the School Facilities Planning Division should be consulted for setbacks.

### ELECTROMAGNETIC FIELDS, SOURCES OF FURTHER INFORMATION:

- California State Department of Education, School Facilities Planning Division
- California State Department of Education, *School Site Selection and Approval Guide*, 1989.
- U.S. Environmental Protection Agency
- Pacific Gas and Electric Company
- Southern California Edison Company
- U.S. Department of Energy

[1] California State Department of Education, *School Site and Selection and Approval Guide*, Sacramento 1989; School Facilities Planning Division, 1991.

# *CITY OF REDLANDS*

# *FINAL ENVIRONMENTAL IMPACT REPORT*

## *GENERAL PLAN UPDATE*

**OCTOBER 1995**

Prepared for:

City of Redlands
Community Development Department
35 Cajon Street
Redlands, California 92373
(909)798-7555

Prepared by:

Smith, Peroni & Fox, Planning Consultants, Inc.
960 East Tahquitz Canyon Way, Suite 103
Palm Springs, California 92262

Blayney Dyett Greenberg
70 Zoe Street
San Francisco, California 94107

## TABLE OF CONTENTS


| | | | PAGE |
|---|---|---|---|
| 1.0 | SUMMARY | | 1 |
| | 1.2 | Executive Summary | 2 |
| | 1.3 | Significant Adverse Impacts not Mitigated by the Draft General Plan | 12 |
| | 1.4 | Impacts Found not to be Significant at a Local Level | 12 |
| | 1.5 | Major Areas of Controversy | 12 |
| | 1.6 | Issues to be Resolved | 14 |
| | 1.7 | Summary of Alternatives | 14 |
| 2.0 | INTRODUCTION | | 1 |
| | 2.1 | EIR Approach | 1 |
| | 2.2 | Definition and Objectives of the Project | 2 |
| | 2.3 | The Planning Process | 3 |
| | 2.4 | Project Description | 4 |
| | 2.5 | Use of the MEA/EIR | 4 |
| | 2.6 | Plans and Policies of Other Agencies | 4 |
| 3.0 | LAND USE | | 1 |
| 4.0 | OPEN SPACE | | 1 |
| 5.0 | SEISMICITY, GEOLOGY, AND SOILS | | 1 |
| | 5.1 | Geology and Soils | 1 |
| | 5.2 | Faulting and Seismicity | 3 |
| | 5.3 | Additional Seismicity, Geology, and Soils Mitigation and Unmitigable Impacts | 5 |
| 6.0 | AGRICULTURAL LANDS | | 1 |
| 7.0 | HYDROLOGY | | 1 |
| | 7.1 | Drainage and Flooding Impacts and Mitigation Provided by Plan Policy | 1 |
| | 7.2 | Water Supply and Conservation | 2 |
| | 7.3 | Water Quality | 5 |
| 8.0 | BIOTIC RESOURCES | | 1 |
| 9.0 | MINERAL RESOURCES | | 1 |
| | 9.1 | Mineral Resources Impacts and Mitigation Provided by Plan Policy | 1 |
| | 9.2 | Additional Mineral Resources Mitigation and Unmitigable Impacts | 2 |
| 10.0 | CLIMATE, AIR QUALITY, AND WIND | | 1 |
| | 10.1 | Climate, Air Quality, and Wind Impacts and Mitigation Provided by Plan Policy | 1 |
| | 10.2 | Additional Climate, Air Quality, and Wind Mitigation and Unmitigable Impacts | 8 |
| 11.0 | HISTORIC, ARCHAEOLOGIC, AND PALEONTOLOGIC RESOURCES | | 1 |
| | 11.1 | Historic Resources Impacts and Mitigation Provided by Plan Policy | 1 |
| | 11.2 | Archaeologic and Paleontologic Resources | 2 |

**PAGE**


| | | |
|---|---|---|
| 12.0 | VISUAL QUALITY | 1 |
| 12.1 | Environmental Setting | 1 |
| 12.2 | Visual Elements | 1 |
| 12.3 | Visual Quality Impacts and Mitigation Provided by Plan Policy | 1 |
| 12.4 | Additional Visual Quality Mitigation and Unmitigable Impacts | 2 |
| 12.5 | Light and Glare | 2 |
| 13.0 | TRAFFIC | 1 |
| 13.1 | Traffic and Transportation Impacts and Mitigation Provided by Plan Policies | 1 |
| 14.0 | AIRPORT SAFETY | 1 |
| 15.0 | NOISE | 1 |
| 16.0 | COMMUNITY SERVICES | 1 |
| 16.1 | Water | 1 |
| 16.2 | Sewer | 1 |
| 16.3 | Parks | 2 |
| 16.4 | Schools | 3 |
| 16.5 | Police | 5 |
| 16.6 | Fire | 5 |
| 16.7 | Emergency Management | 6 |
| 16.8 | Waste Management | 7 |
| 17.0 | ENERGY | 1 |
| 18.0 | ELECTROMAGNETIC FIELDS | 1 |
| 19.0 | ALTERNATIVES TO THE PROPOSED PROJECT | 1 |
| 19.1 | Description of Alternatives | 1 |
| 19.1.1 | Alternative #1: Proposed Project | 1 |
| 19.1.2 | Alternative #2: Existing General Plans | 2 |
| 19.1.3 | Alternative #3 No Project/No Development (1995 Conditions) | 2 |
| 19.1.4 | Alternative #4: Reduced Development | 2 |
| 19.1.5 | Alternative #5: Reduced Traffic | 3 |
| 19.2 | Conclusion and Comparison of Alternatives Matrix | 3 |
| 20.0 | CEQA TOPICS | 1 |
| 20.1 | Cumulative Impacts | 1 |
| 20.2 | Significant Unavoidable Adverse Impacts | 8 |
| 20.3 | Irreversible and Irretrievable Commitment of Resources | 8 |
| 20.4 | Growth Inducing Impacts | 9 |
| 21.0 | MONITORING AND REPORTING | 1 |
| 22.0 | REPORT PREPARATION STAFF, CONSULTANTS, AND BIBLIOGRAPHY | 1 |
| 23.0 | AGENCIES, ORGANIZATIONS AND PERSONS CONSULTED | 1 |

TECHNICAL APPENDICES

| | |
|---|---|
| Appendix A | Buildout Land Use Assumptions |
| Appendix B | Traffic Technical Report |
| Appendix C | Air Quality Technical Report |
| Appendix D | Noise Element Technical Report |

## LIST OF TABLES


| | PAGE |
|---|---|
| EIR Table 1.1, Redlands General Plan Elements | 1 |
| EIR Table 1.2, Existing Development and General Plan Holding Capacity | 3 |
| EIR Table 2.1, DEIR Topics and Location Within Document | 1 |
| EIR Table 3.1, Existing Condition and Buildout Scenarios | 1 |
| EIR Table 3.2, Net Change in Development | 2 |
| EIR Table 4.1, Open Space Under Proposed General Plan | 1 |
| EIR Table 9.1, Land Use Impacts on Significant Construction Aggregate Resources Areas | 2 |
| EIR Table 10.1, Construction Period Equipment Exhaust Emissions | 4 |
| EIR Table 10.2, SCAQMD Significance Threshold Criteria | 4 |
| EIR Table 10.3, Proposed General Plan Buildout Air Pollutant Emissions | 6 |
| EIR Table 10.4, Significance of Long-Term Impacts | 7 |
| EIR Table 10.5, Proposed General Plan Buildout Carbon Monoxide Concentrations | 8 |
| EIR Table 13.1, ADT and LOS on Arterials with Significant Residential Frontage | 2 |
| EIR Table 13.2, Street Right-of-Way Widenings Requiring Extensive Acquisition of Improved Property | 4 |
| EIR Table 15.1, General Plan Buildout Exterior Noise Exposure Adjacent to City Roadways | 3 |
| EIR Table 15.2, Increase in Motor Vehicle Noise | 5 |
| EIR Table 16.1, Existing and Proposed Park Acreage | 2 |
| EIR Table 16.2, Enrollment Per Housing Unit | 4 |
| EIR Table 17.1, Electricity Consumption at Buildout | 1 |
| EIR Table 17.2, Natural Gas Consumption at Buildout | 2 |
| EIR Table 19.1, Statistical Comparison of Alternatives | 1 |
| EIR Table 19.2, Comparison of Alternatives | 4 |

# 1.0 SUMMARY

Redlands General Plan / EIR

## 1.0 SUMMARY

### PROJECT DESCRIPTION

This Final Environmental Impact Report (FEIR) evaluates the potential impacts of adoption and implementation of the General Plan of the City of Redlands. The FEIR evaluates the impacts from implementation of the policies of the General Plan Elements which consist of the following: Growth Management, City Design and Preservation, Land Use, Circulation, Housing, Open Space and Conservation; Health and Safety, Noise, Human Services, and Economic Development. These Elements are listed in EIR Table 1.1. The City used the FEIR to make an informed decision on the potential environmental impacts resulting from the adoption of the General Plan. The City may also use the FEIR as a Program EIR in connection with future development projects. The City's General Plan may also be used by other governmental agencies such as: State of California, County of San Bernardino, San Bernardino County Flood Control District, and the Redlands Unified School District.

**EIR Table 1.1**
**Redlands General Plan Elements**

| GENERAL PLAN SECTION # | GENERAL PLAN ELEMENT TITLE | MANDATORY OR OPTIONAL? |
|---|---|---|
| 2 | Growth Management Element | Optional |
| 3 | City Design and Historic Preservation Element | Optional |
| 4 | Land Use Element | Mandatory |
| 5 | Circulation Element | Mandatory |
| 6 | Housing Element* | Mandatory* |
| 7 | Open Space and Conservation Element | Mandatory |
| 8 | Health and Safety Element | Mandatory |
| 9 | Noise Element | Mandatory |
| 10 | Human Services Element | Optional |
| 11 | Economic Development Element | Optional |

* The complete Housing Element is bound separately from the other General Plan elements, but a summary of housing needs and the Housing Program section of the Element appears as Section 6.

The FEIR evaluates changes projected to occur as Redlands approaches buildout. The year 2010 is the anticipated timeframe through which this planning effort is deemed relevant to the City of Redlands although full buildout is not expected to occur until after that time. Based on prior studies done for the East Valley Corridor, market absorption of the Commercial Industrial lands in particular is not expected to occur until the year 2028 or beyond. Thus, the "Project" analyzed in this document is the anticipated cumulative change in conditions from the existing (1988-1994) environmental setting. Consistent with the California Environmental Quality Act (CEQA), the FEIR focuses on the physical environment and does not analyze social and economic issues. The objective of the General Plan is to establish a consistent basis for City decisions on both public and private development proposals within the Planning Area during the next 15 years.

The General Plan, the Master Environmental Assessment (MEA), and the Draft Environmental Impact Report (DEIR) (the latter two bound together as a combined MEA/DEIR) were available through the City of Redlands. The MEA/DEIR was circulated for a 45-day review period and was intended as an informational document for responsible or interested agencies associated with the proposed project as well as the general public. After the close of the review period, responses were prepared addressing those written comments received or oral

comments made in public meetings. The MEA/DEIR, together with public comments and responses to comments, constituted the Final EIR (FEIR). Once completed, the FEIR was brought before the City Council for certification. The General Plan, with any changes deemed appropriate following review of the DEIR and public hearings on the Plan, were recommended upon by the Planning Commission and submitted to the City Council. The Draft EIR was then amended to reflect the response to comments and hearings. The document as currently written is the Certified Final EIR.

While pertinent portions of the General Plan are described herein, readers of the FEIR should refer to the General Plan , available at the City of Redlands, for a complete listing of its Guiding and Implementing Policies. Key exhibits reproduced from the General Plan for the readers convenience include EIR Table 1.2, Existing Development and General Plan Holding Capacity which provide a convenient summary of proposed land use changes by planning sector within the Planning Area and MEA Figure 2.4, Proposed Land Use Diagram, which depicts the land uses upon which the environmental analysis is based. Other exhibits providing a general context to this analysis include MEA Figure 1.2, Regional Location which identifies the Regional location of the Redlands Planning Area, MEA Figure 1.3, Planning Boundaries which identifies the City limits and planning boundaries and MEA Figure 1.4, Planning Sectors and Traffic Analysis Zones which illustrates planning sectors.

The following section summarizes each topic discussed in this FEIR, its probable effects on the environment, measures to mitigate these impacts, and any significant unavoidable adverse impacts due to implementation of the project.

## 1.2 Executive Summary

### Land Use Impacts and Mitigation Provided by Plan Policy

Buildout of the proposed General Plan will increase the number of dwelling units by approximately 9,500 over existing conditions. The amount of non-residential building area would increase by approximately 31,500,000 square feet. The most substantial growth area associated with the project is industrial and commercial land uses in the northwestern portion of the City. However, the majority of commercial/industrial is located in the East Valley Corridor Specific Plan, approved as a General Plan Amendment in 1989. Most of the remaining undeveloped land in the planning area would remain in open space or be developed at very-low residential densities. The General Plan Diagram establishes the land use pattern throughout the planning area and is intended to promote orderly patterns of development. Policies in the Land Use Element serve to prevent land use conflicts from occurring both within the Planning Area and with uses in surrounding jurisdictions. Policies contained in other elements of the General Plan also serve to prevent land use impacts.

### Unmitigable Impacts

The General Plan land use diagram and plan policies are anticipated to provide adequate mitigation to potential land use impacts and no further mitigation measures are required.

### Open Space Impacts and Mitigation Provided by Plan Policy

The General Plan proposes the conversion of about 9,000 acres of open space (i.e., vacant land, agriculture, flood control) to urban uses. Urban uses include Very Low, Low, Low-Medium, Medium or High Density Residential, Office, Commercial, Industrial or Public/Institutional. The impacts of open space conversion to urban uses are discussed in Biotic Resources, Flooding, Mineral Resources, Agricultural Lands, and Parks.

EIR Table 1.2, Existing Development & GP Holding Capacity (GP Table 4.1)

Unmitigable Impacts

With urbanization loss of open space cannot be entirely avoided and is deemed to be an unavoidable significant adverse impact. Policies in the General Plan Open Space Element as well as other elements provide reduction of potential open space impacts as much as possible and no further mitigation measures are required.

Geotechnical Impacts and Mitigation Provided by Plan Policy

Potential geotechnical hazards or constraints may occur within the planning area when combined with steep slopes. Slopes steeper than 15 percent are subject to erosion of both soil and rock. Out of 33,100 acres in the Planning Area, about 4,200 acres are slopes of 15-30 percent, and about 3,700 acres are slopes of over 30 percent. Other geologic and geotechnical hazards which may limit development opportunities include: Slope instability, such as natural and man-made landslides, rockfall, mud/debris flow and soil creep; subsidence (groundwater withdrawal); expansive soils; compressible/collapsible soils, such as water induced ground collapse; percolation potential/effluent disposal; and, blasting impacts.

Several seismically active, active and potentially active faults either transect or are in close proximity to the Planning Area. The California Division of Mines and Geology identifies active faults under the Alquist-Priolo Earthquake Fault Zone Act. In the vicinity of the Planning Area, the San Andreas and San Jacinto faults have been classified as "active" under the Alquist-Priolo Act. Other active or potentially active faults include the Redlands fault, the Reservoir Canyon/Crafton fault, the Loma Linda fault, the Greenspot fault and portions of the Chicken Hills and Western Heights faults. The General Plan includes policies requiring identification and avoidance of geotechnical hazards where possible and/or the use of construction techniques which recognize and accommodate geotechnical concerns. Individual projects are required to assess geotechnical hazards and mitigations on a site specific basis.

Unmitigable Impacts

Despite preventive policies in the General Plan, the Planning Area is part of the seismically active southern California region and the buildout of the General Plan will result in the exposure of additional people and structures to unanticipated seismic hazards. To the extent that commonly accepted seismic regulation provides protection, General Plan Policies and additional policies contained in Section 5.2 of the EIR are anticipated to provide adequate mitigation.

Agricultural Impacts and Mitigation Provided by Plan Policy

Buildout of the General Plan will result in the conversion of about 4,700 acres of agriculture to urban land uses. Policies in the General Plan are intended to preserve the City's remaining 622 acres of Prime Agricultural Land, Unique Agricultural Land, and Agricultural Land of Statewide Importance at buildout. While continued urban expansion will create development pressures on agricultural lands, implementation of these policies will encourage preservation of agriculture.

Unmitigable Impacts

Given the decline in citrus and other farmland in southern California and San Bernardino County, and despite implementation of specific General Plan policies, the loss of agricultural lands that would occur with implementation of the General Plan must be considered a significant unavoidable adverse impact.

## Hydrology Impacts and Mitigation Provided by Plan Policy

**Drainage & Flooding**

Development associated with the General Plan will increase surface runoff, could redirect it, result in higher peak flows and potentially be subject to flooding in areas of insufficient flood control facilities. Some development could occur in areas subject to the 100-year flood. Guiding and Implementing Policies in the General Plan are designed to mitigate these impacts by restricting development in flood zones, requiring more detailed hydrology studies for individual projects, and the requirement that a Master Drainage Plan be prepared for the entire Planning Area.

**Water Supply and Conservation**

The City of Redlands Municipal Utilities Department estimates the per capita consumption rate of domestic water for residents in the Planning Area to be 300 gallons per capita per day (gpcd). Applying this rate to the current estimated population of 66,301 within the City limits yields approximately 19,890,300 gpcd. Applying this same rate to residents outside the City limits (1,855) yields an additional 556,500 gpcd. This would total approximately 20,446,800 gpcd. Applying the same consumption rate to the projected 35,343 person population increase resulting from General Plan development yields an additional 10,602,900 gpcd. Total domestic water consumption at buildout is estimated to be 31,049,700 gpcd. Since there will be less agriculture at General Plan buildout, impacts on water demand for agriculture are considered less than significant. Impacts upon water supply are considered mitigable on a local level. General Plan policies address the need to preserve floodplains and open space areas for ground water recharge, and the need to preserve water supplies through recycling and conservation measures. Regional impacts may occur due to a number of factors and are beyond the control of the City.

**Water Quality**

Buildout of the General Plan will create an increase in urban runoff due to rainstorms and incidental runoff due to automobile washing, landscape irrigation, etc. This runoff has the potential of contaminating groundwater due to pollutants associated with urban runoff. The existing federal N.P.D.E.S. program requires certain broad classes of industrial uses as well as development projects over 5 acres in size to incorporate Best Management Practices (BMPs) aimed at controlling pollutant discharge to the maximum extent practicable. Policies in the General Plan require adherence to this federal permit program and will mitigate the potential pollutant impacts of surface runoff. The use of treated waste water could also have a negative effect on water quality by increasing the amount of Nitrate and Total Dissolved Solids (TDS) which percolate to the ground water. This impact can also be mitigated by incorporating BMP's into projects as required by federal law.

## Unmitigable Impacts

Policies in the General Plan will adequately mitigate any impacts associated with water supply, water quality, and flooding. No significant unmitigable adverse impacts are anticipated with respect to these issues.

## Biotic Resources Impacts and Mitigation Provided by Plan Policy

Implementation of the proposed General Plan will reduce the amount of habitat available to wildlife due to conversion of agricultural land to urban uses and due to conversion of undeveloped land to urban uses. Policies in the General Plan which address conversion of agriculture and other habitat to urban uses include evaluation of habitat value prior to conversion and if found to be significant, consideration of incorporating similar habitat value into the project.

Specific biological resources in the Planning Area which are listed as endangered by state and federal agencies are two plants (Santa Ana River Woolystar, Slender-Horned Spineflower) and one animal (Least Bell's Vireo). A third plant, Nevin's Barberry is listed only by the State as endangered. Another animal, the Stephen's

Kangaroo Rat is listed as threatened by the State, while it is federally listed as endangered. Finally, two other animals listed as endangered are the Least Bell's Vireo (federal) and the Western Yellow Billed Cuckoo (State). Most of the Planning Area's valued habitat for rare, threatened or endangered species is designated as Flood Control, Resource Conservation, or Parks/Golf Courses on the proposed General Plan Map. In addition, General Plan policies specify coordination with appropriate agencies and jurisdictions to ensure preservation of valued habitat. These policies will serve as mitigation to reduce or avoid impacts to biotic resources.

Although policies will mitigate impacts due to implementation of the proposed General Plan, other concerns which could affect biotic resources include availability of surface water, introduction of domestic animals into or adjacent to natural habitat, and introduction of plant species invasive to native habitat. Biological surveys required by the General Plan would assess availability of surface waters and would require restoration or preservation of any wetlands. Requirements to provide buffers between structures and naturally occurring habitat can help mitigate impacts due to domestic animals. Policies in the General Plan would expand the street tree list and require native vegetation in public areas. This will help alleviate impacts due to introduction of exotic species.

#### Unmitigable Impacts

Despite the General Plan's emphasis on conservation of biotic resources, the net loss of habitat due to implementation of the General Plan will contribute to the regional loss of habitat that has been taking place since urbanization of the San Bernardino Valley and southern California. These effects are deemed to be a significant unmitigable adverse impact unless all development is discontinued, which is not considered a viable option.

#### Mineral Resources Impacts and Mitigation Provided by Plan Policy

Mineral resources in the Planning Area consist primarily of sand and gravel construction aggregates used for making concrete and concrete products. The California Division of Mines and Geology (CDMG) estimates that there are seven times the amount of construction aggregates in the San Bernardino Production-Consumption area to supply the region for the next 43 years. However, since not all of these resources are available as reserves, CDMG predicts a shortfall of construction aggregates over the next 35 years. There are approximately 5,000 acres of CDMG designated MRZ-2 Zone (identifies regionally significant resources) in the Planning Area. Of this 5,000 acres, 799 acres are presently designated as "reserves" where mining is permitted.

The General Plan preserves 87% of MRZ-2 lands (4,400 acres) and all reserve areas (799 acres). By limiting areas to be conserved to those within the Santa Ana Wash, the General Plan prevents major land use conflicts that would result if all MRZ land were conserved.

#### Unmitigable Impacts

Because the General Plan takes appropriate steps to protect mineral resources, provides for adequate local contribution to future regional needs, and contains policies to protect adjacent land use from impacts of mining no unmitigable impacts are anticipated to result from plan implementation.

#### Air Quality Impacts and Mitigation Provided by Plan Policy

Implementation of the General Plan would result in generation of additional pollutants from stationary sources (construction activities, electrical and natural gas usage) and mobile sources primarily from increased vehicular travel. Short-term impacts will result from construction activities due to site disturbance and emissions from construction equipment.

Numerous specific policies contained in the General Plan are designed to reduce vehicle trips by promoting TDM measures including carpooling, modified work schedules to reduce peak hour traffic, encouraging public transit and bicycling, parking management strategies which discourage single-occupancy vehicles, and planning for intra-regional and main line rail services. Additional policies encourage support of legislation which would reduce emissions and managing growth in order to achieve a balance of jobs and housing. Development is encouraged to be designed in a manner that will minimize direct and indirect emissions of air contaminants. There are also policies which require adoption of procedures and regulations which minimize particulate emissions during construction activities. Measures which promote energy conservation to minimize stationary source emissions are also included.

**Unmitigable Impacts**

By incorporating AQMP measures and policies in the General Plan, the City will show a commitment to improving air quality through its community planning and development process on a local level. Plan policies are expected to provide adequate mitigation and no unmitigable significant adverse impacts related to climate, air quality, and wind are anticipated as a result of implementation of the General Plan. However, air quality impacts on a regional level remain a concern due to continued exceedance of state and federal standards.

**Historical/Archaeological Resources Impacts and Mitigation Provided by Plan Policy**

Approval of the General Plan will encourage development within the Planning Area which could potentially have an adverse impact on areas which have not been surveyed for archaeological resources. Policies in the General Plan serve to encourage preservation of known archaeological resources and any incidental discovery of artifacts during the course of development. There is also the potential for adverse impacts on the City's historical and cultural resources. However, the Land Use Plan does not propose intensification of land uses in historical areas and policies in the General Plan serve to identify, maintain, protect, and enhance the City's cultural, historic, and architectural resources.

**Unmitigable Impacts**

General Plan policies are anticipated to provide adequate mitigation and no further measures are necessary. There are not expected to be any unmitigable impacts associated with archaeologic and paleontologic resources as a result of General Plan implementation.

**Visual Resources Impacts and Mitigation Provided by Plan Policy**

The primary visual impact of General Plan implementation will be an increase in urban growth. Such growth would likely reduce the perception of Redlands as a free standing city dominated by agriculture and natural open space. It would permanently alter the character from agriculture or open space to urban development and is a potential significant adverse impact of the project. In response to this impact, the Plan has both guiding and implementing policies for City design and historic and scenic preservation. These policies seek to retain the traditional town character by preserving historic architectural resources and minimizing intrusion of commercial development along residential arterial streets. Other policies limit development on hillsides, encouraging landscaped medians and scenic overlooks, requirements to plant large-scale trees along arterials and encouraging completion of the Santa Ana River blufftop scenic drive. The effects of light and glare are also addressed by policies requiring attention to lighting design. These policies will mitigate visual impacts to a level of insignificance.

**Unmitigable Impacts**

Impacts are mitigated by General Plan policy and no unmitigable impacts are anticipated.

Traffic Impacts and Mitigation Provided by Plan Policy

Implementation of the General Plan would result in significant traffic impacts despite the roadway improvements specified in the Circulation Element. Direct impacts as a result of the General Plan would include an increase in average daily trips, impacts to residential units fronting onto arterials and high volume traffic on residential collector streets. Traffic level of service would be E or F on nine arterial street segments and on segments of Interstate-10 and State Route 30.

Policies in the Circulation Element aim at reducing impacts caused by implementation of the General Plan and mainly include maintaining an LOS C or better, monitoring traffic levels of service, implementing roadway improvements, reviewing the Circulation Network with neighboring jurisdictions, coordinating freeway and highway requirements with Caltrans, levying fees on new developments for roadway improvements, keeping certain roadway classifications below specified average daily trip volumes, supporting the Congestion Management Program of San Bernardino County, establishing a comprehensive network of bicycle and pedestrian routes and developing the airport utilizing the 1993 Municipal Airport Master Plan.

**Unmitigable Impacts**

Although policies included in the Circulation Element provide various types of mitigation measures to reduce impacts on traffic, implementation of the General Plan will result in significant unavoidable adverse impacts.

Airport Safety Impacts and Mitigation Provided by Plan Policy

The major potential impacts associated with airport planning are noise and the establishment of clear zones to minimize crash hazards. Noise projections for the proposed San Bernardino International Airport have not at this time been finalized but preliminary forecasts indicate no adverse impacts for the Planning Area. Policies require coordination with the San Bernardino International Airport Authority as operations and flight patterns are further developed. The Redlands Municipal Airport Master Plan has determined that noise and safety issues from this facility do not pose significant impacts on adjacent land uses.

Unmitigable Impacts

General Plan policy is anticipated to provide adequate mitigation for impacts associated with airport noise and safety. No unmitigable impacts are expected. It should be noted, however, that noise impacts associated with operation of San Bernardino International Airport can only be definitely determined when more specific flight and operations plans have been finalized.

Noise Impacts and Mitigation Provided by Plan Policy

Noise sources in the Planning Area will include general vehicle traffic, the Southern Pacific (SP) and possibly from Metro-Link (formerly the Atchison, Topeka and Santa Fe (AT&SF) Railroad) railroads, the Redlands Municipal Airport, and short term construction noise.

Implementation of the General Plan will generate 1.01 million daily vehicle trips, thus increasing traffic noise in the area. Trains passing through the City will also cause noise impacts. The SP has a line which runs through the southern portion of the City and is estimated that 40 trains per day use this. These facilities may cause impacts to residential dwellings in the vicinity. Additional impacts may be associated with the Redlands Municipal Airport due to overflights as a result of airport operations. Although noise impacts caused by construction will occur throughout General Plan buildout, they are anticipated to be short term and can be mitigated as discussed below.

Numerous specific policies contained in the General Plan are designed to reduce noise by promoting noise abatement measures including installing sound walls, insulation, berms, and landscaping. Development is encouraged to be designed in a manner that will minimize direct and indirect noise impacts. Policies in the General Plan will mitigate impacts to roadways within the Planning Area and briefly include maintaining level of service C or better within the East Valley Corridor and at all intersections, monitoring traffic levels and implementing the Circulation Element improvements, developing Transportation Demand Management programs to reduce vehicle miles travelled, street widening (from 2 to 4 lanes and 4 to 6 lanes) and construction of new roads, developing alternate forms of transportation, coordinating with Caltrans on freeway and highway improvements, acquiring additional right-of-ways for street widening, and developing safe pedestrian paths and bikeways.

Impacts caused by the Redlands Municipal Airport are mitigated by the airport's Master Plan which shows existing and future noise contours and General Plan policies which aim at maintaining compatibility of airport operations with development in the surrounding area. Other policies require use of aircraft noise abatement measures for departure of aircraft and limiting land uses within the projected 65 CNEL Db contour to agriculture, open space and light industry.

Because residential uses are not situated close to the railroad lines, no project related increases in railroad noise impacts are anticipated. Areas with potential noise impacts due to traffic can be mitigated with noise barriers including sound walls and landscaping. Short term impacts from construction noise can be mitigated by policies which limit the hours of operation for all construction or demolition projects. There are also policies which require adoption of procedures and regulations which minimize noise during construction activities.

<u>Unmitigable Impacts</u>

By incorporating noise abatement measures in the General Plan, the City will show a commitment to reducing noise levels through its community planning and development process. However, full mitigation of noise increases greater than 4dB resulting in excess of 65 CNEL in residential areas are not likely to be provided at some locations, and not feasible where the noise source will be an aircraft or a freeway without soundwalls that create a line of sight barrier.

<u>Wastewater Impacts and Mitigation Provided by Plan Policy</u>

Implementation of the General Plan will create additional demands on the existing sewer system due to potential increase in new residential, commercial, and industrial development in the Planning Area. The <u>Wastewater Collection Master Plan</u> is designed with a buildout population of 180,000 which is nearly twice the projected General Plan buildout population. Future treatment capacity is expected to be met with expansions of capacity as required. Development proposals in non-sewered sections of the Planning Area shall develop solutions for providing wastewater treatment to the City and Regional Water Quality Control board.

<u>Unmitigable Impacts</u>

Policies in the General Plan will provide adequate mitigation for impacts to the sewer system. There is not anticipated to be any unmitigable significant adverse impacts to the sewer system and no additional mitigation is required.

<u>Parks Impacts and Mitigation Provided by Plan Policy</u>

The General Plan proposes over 400 acres of additional parkland within the Planning Area for a total of 753 acres. Assuming a buildout population of 101,644, there will be more than 7 acres of parkland per 1,000 residents which exceeds the City's goal of 5 to 6 acres of parkland per 1,000 residents. There are also policies which prevent slopes and conservation areas from being developed.

Unmitigable Impacts

Policies in the General Plan will provide adequate mitigation for impacts related to parks and no additional mitigation is required.

Schools Impacts and Mitigation Provided by Plan Policy

Implementation of the General Plan will create additional demands on school facilities due to new dwelling units in the Planning Area. These impacts are mitigated by the imposition of development fees on all new construction by the School District. Policies in the General Plan are designed to mitigate any impacts on school facilities, including improvement of facilities and better communication between the City and the School District in new school planning.

Unmitigable Impacts

It is anticipated that with implementation of General Plan policies and the current construction of two new schools, that future enrollment will be adequately served. The Plan also provides locations for two more elementary schools. No further mitigation is required and no unmitigable impacts are expected.

Police Impacts and Mitigation Provided by Plan Policy

Implementation of the General Plan will result in additional demand for police protection services due to the proposed increase in commercial and residential uses. These impacts are mitigated by the imposition of development impact fees to pay for new officers and facilities.

Unmitigable Impacts

Current policies and procedures are expected to provide adequate mitigation and no further measures are necessary. There are not anticipated to be any unmitigable impacts related to provision of police service.

Fire Protection Impacts and Mitigation Provided by Plan Policy

Implementation of the proposed Plan will create additional demands on existing fire protection services due to the increase in new residential and commercial structures in the Planning Area. Additional impacts on fire services will be associated with development within the high fire hazard regions. In response to these impacts, the Plan has policies help prevent fires and reduce the potential for loss of lives, property and natural resources.

Unmitigable Impacts

Policies in the General Plan will provide adequate mitigation for impacts related to fire protection and no additional mitigation is required.

Emergency Management Impacts and Mitigation Provided by Plan Policy

Implementation of the General Plan will result in increased population which will expose additional people to hazards in the area. Policies identify the Redlands Emergency Disaster Plan as the guide for disaster planning, and specify its ongoing revision to reflect any changes to the Plan area.

Unmitigable Impacts

Plan policies will provide adequate mitigation and no further measures are necessary. There are not anticipated to be any unmitigable impacts related to emergency management as a result of General Plan implementation.

Waste Management Impacts and Mitigation Provided by Plan Policy

Buildout of the General Plan would result in an estimated increase of approximately 34,500 people to the Planning Area at buildout. This is anticipated to result in a net increase in the area's solid waste generation. General Plan policies express a commitment to a reduction in per capita waste generation and an increase in recycling. In addition, the Plan commits to compliance with AB 939 (California Integrated Waste Management Act of 1989) and subsequent amendments to the act.

Unmitigable Impacts

Policies in the General Plan will provide adequate mitigation for impacts to the waste management system and no additional mitigation is required. No unmitigable impacts are anticipated.

Energy Impacts and Mitigation Provided by Plan Policy

Buildout under the proposed General Plan update will result in an increase in the consumption of electricity and natural gas in residential, commercial and industrial buildings. The actual demand for energy resources will vary depending on the type of energy systems incorporated into the building design and the degree of its usage as a primary energy source. Although the increase in energy consumption appears to be substantial, local energy suppliers have stated that the Planning Area can continue to be serviced from facilities within the area. Should the demand for energy services exceed supply, the utility companies have indicated that they would expand to meet the demand. This service would be in accordance with the company's extension rules on file with the California Public Utilities Commission at the time contractual agreements are made.

Although energy resource impacts do not appear to be significant, several policies in the Open Space Element of the General Plan identify conservation of scarce or non-renewable energy resources, encouraging the use of alternative resources, and support of San Bernardino County's energy-related policies and energy efficiency measures.

Unmitigable Impacts

While numerous policies relative to energy conservation are included in the General Plan, energy consumption related to buildout will still have a significant unavoidable adverse impact on supplies of non-renewable energy resources.

Electromagnetic Fields Impacts and Mitigation Provided by Plan Policy

The major potential impact associated with electromagnetic fields is its potential effect on health. This potential health hazard has not been conclusively demonstrated but is being studied in relation to 220 kilovolt power lines or greater. Since these lines are currently located only in remote low density areas of the Planning Area, existing potential impacts are minimal. Future construction within areas of potential exposure is prevented by General Plan policy. Additional policies encourage support of research into the health effects of electromagnetic fields generated by power transmission lines and other sources and to take appropriate action if necessary.

### Unmitigable Impacts

Policies in the General Plan will provide adequate mitigation and no additional mitigation is required. There are not anticipated to be any unmitigable impacts as a result of the project.

## 1.3 Significant Adverse Impacts not Mitigated by the Draft General Plan

An objective of the General Plan is to implement well-designed policies which will avoid causing significant adverse environmental impacts. In this sense, the Plan is seen as "self-mitigating." Despite this goal, significant adverse environmental impacts remain, some attributable to implementation of the Plan, others as a result of regionally cumulative impacts. Each is described in more detail in the appropriate section of the DEIR:

- **Agricultural Land**: Loss of about 4,700 acres of agricultural land, including loss of 30 percent of existing citrus acreage to urban development even if all Agricultural and Rural Living acreage designated by the General Plan Diagram were maintained or planted in citrus. Actions in addition to the policies in the Draft Plan would be required if all of the area designated Agriculture is to be preserved.

- **Traffic:** Unacceptable Traffic Level of Service (LOS) E or F on 9 arterial street segments and on segments of the I-10 and Route 30 freeways. Disruptive street right-of-way widening along fully or partially developed segments of seven arterials.

- **Noise:** Noise increases greater than 4 dB CNEL resulting in excess of 65 CNEL in residential areas. Full mitigation is judged not likely to be provided at some locations and not feasible where the noise source will be aircraft or a freeway without soundwalls that create a line of sight barrier.

- **Open space:** Loss of over 7,000 acres of open space and agriculture to urban uses.

- **Biotic Resources** (regional and cumulative impact issue): Loss of habitat in a region that has been lost since the beginning of settlement. In addition, potential impacts on sensitive species within a region that has been experiencing such effects since settlement began.

- **Air Quality** (regional and cumulative impact issue): Although the City of Redlands will incorporate air quality measures established by the South Coast Air Quality Management District in the General Plan to mitigate impacts on a local level, continued exceedance of state and federal standards will occur on a regional level.

## 1.4 Impacts Found not to be Significant at a Local Level

With full General Plan implementation, some of the proposed measures are anticipated to have environmental impacts which are either found not to be significant at a local level, or are expected to have a net positive impact on the City's resources. This is true of the following:

- Seismicity, Geology, and Soils
- Drainage and Flooding
- Water Supply and Conservation
- Water Quality
- Biotic Resources (significant at a cumulative level)
- Mineral Resources
- Climate, Air Quality, and Wind (significant at a cumulative level)
- Historic, Archaeologic, and Paleontologic Resources
- Visual Quality
- Airport Safety

- Sewage Collection and Disposal
- Fire
- Waste Management
- Energy
- Electromagnetic Fields

## 1.5 Major Areas of Controversy

Several issues debated during preparation of the Draft General Plan were not resolved to the satisfaction of all or nearly all participants in the process, and the Plan's treatment of them remains controversial. These include:

- **Agricultural land preservation:** Should more be preserved or should urban development be permitted?

- **Airport noise impact:** Will the use of the San Bernardino International Airport have an impact on land uses in the City of Redlands?

- **Medium density housing share:** Should the present share of apartments be maintained or increased to meet affordable housing needs or should the share be decreased at buildout to maintain or restore Redlands' predominantly single-family character?

- **East Valley Corridor Specific Plan (EVCSP):** Should the Specific Plan and General Plan Amendment adopting the EVCSP in 1989 be incorporated in the General Plan or should it be deleted or modified to reduce traffic impacts and/or provide additional sites for housing?

- **Residential Density in San Timoteo Canyon and the Crafton Hills:** Should development other than one unit per existing parcel be prohibited where slopes exceed 30 percent? Should land in San Timoteo Canyon under 15 percent slope be developed with lots one acre or larger?

- **Expansion of nonresidential uses adjoining existing residential neighborhoods:** Should neighborhoods be protected against encroachment by more intensive development or should the need for adjoining institutions and businesses to expand on or near present sites be met?

- **Functional street designations and street improvements:** Should arterial and collector streets be designated as needed to accommodate traffic that would be generated by buildout of the land use pattern depicted on the General Plan Diagram? Should street rights-of-way be widened where extensive acquisition of improved property would be necessary?

Other issues are of regional concern, and their causes and resolution transcend the Planning Area boundaries. These concerns are described below:

- **Water supply:** Should dependence on imported water be prevented by restricting all development to that which can be served by local supplies?

- **Habitat:** Should more open space be preserved explicitly for habitat?

- **Air Quality:** Should all development be curtailed unless it can be proved that each new project will lead to a net decrease in emissions?

## 1.6 Issues to be Resolved

Following are problems that are not resolved by the Draft General Plan.

- Establishment of an equitable system for administering Policy 5.20f calling for revision of the East Valley Corridor Specific Plan if certain Level of Service standards are not met.

- Ensuring that additional urban development within the currently unincorporated portions of the Planning Area will be consistent with the adopted Redlands General Plan, that it will be served by the City's sewage collection and disposal system, and that it will be annexed to Redlands.

- Future use of San Bernardino International Airport and its impacts on the Planning Area.

- Preparation of a Master Biotic Management Plan, and subsequent implementation.

In addition, see EIR Section 21.0, Monitoring, for the types of implementing actions which require further attention, after adoption of the General Plan.

## 1.7 Summary of Alternatives

Five alternatives to the Draft General Plan were evaluated and are described in Section 16.

Alternative 1: The Proposed Project (Proposed General Plan)

This is the proposed project (i.e., buildout of all portions of the project area under the proposed City General Plan). Development under the proposed project would result in 36,414 residential units, 8,646,000 square feet commercial, 10,048,000 square feet of office, and 21,642,000 square feet of industrial uses. The projected buildout population under the proposed project is 101,644.

Alternative 2: No Project (Existing General Plans)

This alternative assumes buildout of the Redlands Planning Area under the existing City of Redlands General Plan adopted in 1972. It also assumes buildout under the San Bernardino County General Plan (adopted in 1989 with revisions in 1993) for all unincorporated portions of the Planning Area. Development under this alternative would result in a total of 38,221 residential units, 8,924,780 square feet of commercial uses, 8,397,140 square feet of office, and 29,474,520 square feet of industrial uses within the project area at buildout.

Alternative 3: No Development (Existing Land Use Conditions Only)

This alternative assumes no further development in the project area above 1995 conditions and provides a baseline for environmental analysis. Existing residential units and non-residential structural square feet are 26,906 and 8,824,690, respectively.

Alternative 4: Reduced Development (25% Reduction of Density/Intensity Across Entire Planning Area)

This alternative reduces density of potential new development, as proposed under Alternative #1 throughout the project area by 25% (i.e., the whole project area under proposed City General Plan). Adoption of this alternative would result in a reduction of significant impacts not mitigated by the General Plan. Development under this alternative would result in 27,311 residential units and 30,252,000 non-residential structural square feet within the project area at buildout.

Alternative 5: Reduced Traffic (Employment and Retail/Residential balance)

To achieve a closer local balance between housing and employment/shopping opportunities (and thus a reduction in traffic and elimination of most LOS deficiencies), this scenario assumes a 69 percent reduction in retail square footage and a 37 percent reduction in office and industrial square footage from the proposed General Plan. The land area resulting from this reduction is assumed to support about 2,400 housing units assuming a density of

2.7 dwelling units per acre.

# 2.0 INTRODUCTION

Redlands General Plan / EIR

## 2.0 INTRODUCTION

### 2.1 EIR Approach

This Draft Environmental Impact Report (DEIR) evaluates the probable effects and impacts associated with the proposed adoption of the City of Redlands' Draft General Plan (June 1995) as required by the California Environmental Quality Act (CEQA) and *EIR Guidelines*. The anticipated environmental impacts of the proposed General Plan are measured against the existing community conditions, the not-yet-attained buildout under the current development policy, and two additional viable land use configurations. A detailed discussion of the existing environmental conditions within the Planning Area may be found within the Master Environmental Assessment (MEA) which is bound together with this DEIR, and in Appendix A (City of Redlands, General Plan Update, Traffic Study Technical Report) and Appendix B (Noise Element Technical Appendix).

According to guidelines prepared by the Governor's Office of Planning and Research, "Preparing an Environmental Impact Report for a General Plan," February 1983, a General Plan EIR should cover specific topics. EIR Table 2.1, DEIR Topics and Location Within Document, lists such topics and the corresponding sections in which the discussion may be found.

Since the General Plan covers a wide range of planning issues, the General Plan EIR will necessarily discuss them in more general terms than would an EIR for a specific development project. The bundle of policies and the physical design that constitute the Draft General Plan are less amenable to precise analysis than are the plans and specifications for a hotel or a shopping center, for example. Many policies are statements of "good practice" or of intent, the results of which are not quantified.

More detailed information relating to some sites or planning sectors is available. Because some of the sites addressed by Plan policies have been the subject of earlier development proposals, project-level or area-specific environmental review has already been conducted. These earlier environmental documents are valuable sources of information on environmental and institutional setting; many are referenced in the MEA, and most are available through the City offices. The approximate locations of the study areas of these earlier projects are identified in MEA Figure 1.1, Index to Environmental Documents.

**EIR Table 2.1**
**DEIR Topics and Location Within Document**

| Topic | Location Within Document |
|---|---|
| Project Description | Summary and Introduction |
| Environmental Setting | MEA, Sections 1 through 15 by topic, Technical Appendix |
| Significant Impacts | Summary, EIR Sections 1 through 15 by topic, Section 20 |
| Mitigation Measures | Summary, EIR Sections 1 through 15 by topic, Section 21 |
| Alternatives | Summary, Section 13, and Section 19 |
| | |
| Significant Irreversible Environmental Changes | Section 20 |
| Growth-inducing Impacts | Summary and Section 20 |
| Cumulative Impacts | Section 20 |
| Monitoring and Reporting | Section 21 |

### 2.2 Definition and Objectives of the Project

The subject of this DEIR (the "Project") is the Draft General Plan for the City of Redlands. The Plan envisions the Redlands Planning Area in its built-out state, when no further development on vacant sites will occur. The DEIR evaluates the changes that will occur to reach the buildout condition, and compares the changes to the prevailing conditions, documented as "existing conditions". The existing conditions illustrated and analyzed for the purposes of this document are derived from data gathered between 1988 and 1994 and verified 1995. Thus, the Project is the cumulative change in conditions in the Planning Area from the existing environmental setting to future conditions.

Because the Plan is a long-range policy document, its precise consequences are difficult to anticipate, and its impacts will be felt over an extended period of time. Since the Plan represents a coordinated and consistent set of policies, the Project is defined as full implementation of Plan policies. This includes not merely action on development approvals consistent with the General Plan Diagram, but also implementation of programs established by the Plan as items of City policy.

The General Plan is to establish a consistent basis for City decisions on both public and private development proposals within the Planning Area during the next 15 years although full plan buildout is expected to occur after that time. The City of Redlands has several objectives as part of the General Plan which are summarized below. For a detailed description of each of these objectives, please refer to the Setting and Organization section of the General Plan. These objectives include the following:

- Maintain highly perceptible edges including the Santa Ana Wash on the north, Crafton Hills on the east, Live Oak and San Timoteo canyons on the south, and preservation of citrus groves on the west;
- Produce citrus groves that border the Planning Area which are unique to the City of Redlands.
- Create a small town character which is uncrowded, friendly, small scale, and with a strong presence of nature.
- Preserve a sense of history through landmark buildings, modest bungalow neighborhoods, the Zanja, and citrus groves throughout the City of Redlands.
- Evenly distribute amenities throughout the City of Redlands to serve all residents of the community.
- Generate revenues to help pay for facilities and services to serve the residents of the City of Redlands.

While these objectives are designed to guide development of the City, the Land Use Element of the General Plan provides a more detailed discussion of the uses proposed.

The nature of the planning process, described below, has been to consider possible impacts when making policy choices. The Plan therefore is largely "self-mitigating"; that is, adverse impacts that might occur if the Plan were only partially implemented can be avoided with full implementation of all policies. Since the project by definition includes full implementation, many impacts are avoided. There are certain adverse impacts which remain, however, which are unmitigable, some attributable to implementation of the Plan, others as a result of regionally cumulative impacts. Each of these is listed below and briefly described. To address this issue of unmitigable adverse impacts, a Statement of Overriding Considerations may be prepared as part of the General Plan adoption process which would consider whether the benefits of the project outweigh the impacts involved. A more detailed description of each of these topics is discussed in the appropriate sections of the DEIR. The significant adverse impacts not mitigated by the Draft General Plan include:

- Biotic Resources - reduction of the biotic diversity of plants and animals, reduction for mobility of remaining animal populations, and diminished habitats.

- Agricultural Lands - the conversion of prime agricultural lands to urban uses, thus reducing the agricultural economy and some biotic habitats.

- Energy - consumption of significant amounts of non-renewable sources of energy including natural gas and electricity.

- Air Quality - continued exceedance of state and federal air quality standards, adding to the overall regional problem of clean air.

- Traffic - unacceptable traffic levels of service E or F on several arterial streets.

- Noise - Noise increases in excess of 65 CNEL in several areas conflicting with compatible land uses.

- Open Space - continued loss of open space due to urban uses.

## 2.3 The Planning Process

The City Council appointed a broadly representative 21-member General Plan Committee to oversee and provide direction to the process. The Planning Commission and City Council received recommendations from the Committee and held both separate and joint meetings to make decisions on Plan content. The views of the City's nine Commissions and Boards that are responsible for recommendations on specific development issues including Airport, Parks, Housing, Public Works, Historic and Scenic Preservation, Recreation, Cultural Arts, Redevelopment, and Library were transmitted by members who were appointed to serve as liaisons to the General Plan Committee, or were presented at joint meetings. The City Council reviewed or formulated policies where there were major differences of opinion.

An October 1988 report titled *Working Paper 1: Existing Conditions and Planning Issues* and a series of memos which followed served to summarize those issues which were to be addressed throughout the planning process, and provided options for discussion at meetings.

The "program" which has led to the preparation of the General Plan was designed to ensure continuous communication among the public, the General Plan Committee, the Planning Commission and other City commissions, and the City Council. The structure was intended to facilitate consideration of all views, and to avoid conflicts late in the process.

Blayney Dyett Greenberg, Urban and Regional Planners, served as the planning consultant for the General Plan revision, with DKS Associates, Transportation Planners and Engineers, providing transportation modeling and analysis. ESRI designed and operated an automated database and provided maps, Angus McDonald & Associates was responsible for analysis of public finance issues, and Mestre Greve Associates, Consulting Engineers, performed preliminary noise analysis.

Smith, Peroni & Fox, served as environmental planning consultants to complete the MEA/EIR in conjunction with other subconsultants including, Endo Engineering who provided final noise and air quality analysis, and Steven C. Suitt & Associates who was responsible for documentation of the seismicity, geology and soils section.

## 2.4 Project Description

The "Project" is the full implementation of the bundle of policies and physical design which comprise the Redlands General Plan. This document analyzes the anticipated cumulative change in conditions from the existing (Circa 1995) environmental setting to that imposed by the buildout conditions of the Redlands General Plan. The anticipated time period over which this planning effort is deemed relevant to the City of Redlands is until the year 2010 although full buildout is not expected to occur until after that time.

Land Use Table GP 4.1 from the Draft General Plan is included in the DEIR Summary to provide a convenient outline of proposed land use changes by planning sector within the Planning Area. The Draft General Plan itself constitutes a complete "project description," and readers interested in acquiring an understanding of the full set of General Plan policies should refer to that text in conjunction with the General Plan Diagram.

## 2.5 Use of the MEA/EIR

This MEA/EIR is to be used in evaluating the Redlands Draft General Plan, which will be considered during a series of public meetings. The City of Redlands the Lead Agency will use the MEA/DEIR in the Plan adoption process.

Many future development projects consistent with the Plan will require project-specific EIRs, so this document is not expected to be used directly as the basis for approving or rejecting project proposals. The DEIR does, however, serve as a "first tier" of environmental review, and the environmental baseline information contained within the MEA provides a basis for General Plan policies, with which all projects must be consistent.

## 2.6 Plans and Policies of Other Agencies

During General Plan and MEA/DEIR preparation, several dozen agencies and organizations were contacted, and their plans and policies were reviewed. Draft General Plan policies were designed to conform with and complement policies of other jurisdictions to the extent required, and the Draft General Plan is thus consistent with existing regulatory settings.

Information compiled from the various agencies and organizations has been integrated into this text. A listing of individuals and agencies which were consulted and studies/reports cited in the preparation of the General Plan and environmental documentation is found in EIR Section 23.0, Contacts.

# 3.0 LAND USE

Redlands General Plan / EIR

## 3.0 LAND USE

This section of the Environmental Impact Report (EIR) is intended to provide a comparison of existing land uses (land use conditions as they presently exist); land uses at buildout under the existing City and County General Plans; and policy and land use at buildout under the proposed General Plan. The ensuing discussion will identify the differences in the designation and distribution of land use under each of these scenarios, examine the potential spatial impacts associated with implementation of the proposed project, discuss proposed General Plan policy as it relates to land use, and assess land use compatibility. Proposed land use patterns and General Plan policy as it relates to each EIR issue (i.e., traffic, air quality, biology, etc.) is addressed in the applicable sections of this EIR.

### Comparison of Land Use Changes

The proposed General Plan contains a Land Use Diagram, GP Figure 4.1, depicting the location and type of land uses proposed throughout the City. In order to gauge the relative impacts of these proposed land uses, the following section discusses the potential for development under the proposed General Plan Update and the net differences in development between contrasting development scenarios (i.e., existing conditions, existing General Plans).

The proposed General Plan will grant individual property owners the right to pursue further land development entitlements consistent with the General Plan land use diagram and General Plan policy guidelines. Since General Plan land uses and policy statements are being revised via this update, enactment of the proposed project will facilitate potential changes in land use location and intensity over the existing baseline condition. To allow an equivalent comparison between the various scenarios, the land use information presented in this section is broken down into four broad land use categories (i.e., residential, commercial-industrial-office, public institutional, open space).

EIR Table 3.1, Existing Condition and Buildout Scenarios, identifies the number of residential units, non-residential structural square footage and land use acreage existing as of late 1994 as compared with the estimated number of potential residential units, non-residential structural square footage and land use acreage projected at buildout under the existing and proposed General Plans. MEA Figure 2.1, Existing Land Use, MEA Figure 2.2, City of Redlands Existing General Plan Land Use, MEA Figure 2.3, County Existing General Plan Land Use and MEA Figure 2.4, Proposed General Plan Land Use Diagram, can be consulted for specific land uses under each of these conditions.

**Table 3.1**
**Existing Condition and Buildout Scenarios**

EXISTING CONDITION - 1994 LAND USE

| Land Use | D.U.s | Bldg. ksf | # of Acres | % of Total |
|---|---|---|---|---|
| Residential | 26,906 | | 7,177 | 24% |
| Comm-Indus-Office | | 8,823 | 1,709 | 6% |
| Public-Institutional | | | 1,542 | 5% |
| Open Space* | | | 7,155 | 24% |
| Vacant | | | 12,067 | 41% |
| | 26,906 | 8,823 | 29,650 | 100% |

**Table 3.1 (Continued)**
EXISTING GENERAL PLANS BUILDOUT SCENARIO

| Land Use | D.U.s | Bldg. ksf | # of Acres | % of Total |
|---|---|---|---|---|
| Residential | 38,221 | | 15,674 | 53% |
| Comm-Indus-Office | | 46,796 | 5,792 | 20% |
| Public-Institutional | | | 1,562 | 5% |
| Open Space* | | | 6,622 | 22% |
| | 38,221 | 46,796 | 29,650 | 100% |

PROPOSED GENERAL PLAN BUILDOUT SCENARIO

| Land Use | D.U.s | Bldg. ksf | # of Acres | % of Total |
|---|---|---|---|---|
| Residential | 36,414 | | 14,218 | 47% |
| Comm-Indus-Office | | 40,336 | 3,913 | 13% |
| Public-Institutional | | | 1,477 | 4% |
| Open Space* | | | 10,042 | 33% |
| | 36,414 | 40,336 | 29,650 | 100% |

* Includes Citrus, Agricultural, Resource Conservation

EIR Table 3.2, Net Change in Development, compares existing conditions in the project area to buildout under the two projected conditions described above. As shown in the table, the proposed project could potentially add approximately 7,041 residential acres and approximately 1,195 non-residential acres within the project area at buildout, a roughly 98% and 70% increase over existing conditions respectively. These increases are smaller than the increases in residential and non-residential acres at buildout that would result under the existing General Plan scenario. Additional comparison of buildout under the General Plans scenario identified below, as well as under other alternatives to the proposed project, is contained in Section 19.0, Alternatives.

**Table 3.2**
**Net Change in Development**
**Existing Conditions versus Existing & Proposed General Plans**

RESIDENTIAL COMPARISON

| Buildout Scenario | Residential Acres | Change from Existing Units | Residential Existing | Change from |
|---|---|---|---|---|
| EXISTING COND. | 7,177 | | 26,906 | |
| EXISTING G.P. | 15,674 | + 8,497 | 38,221 | +11,315 |
| PROPOSED G.P. | 14,218 | + 7,041 | 36,414 | + 9,508 |

**Table 3.2 (Continued)**
NONRESIDENTIAL COMPARISON

| Buildout Scenario | Comm-Indust -Office Acres | Change from Existing | Building KSF | Change from Existing |
|---|---|---|---|---|
| EXISTING COND. | 1,718 | | 8,823 | |
| EXISTING G.P. | 5,792 | + 4,074 | 46,796 | + 37,973 |
| PROPOSED G.P. | 3,913 | + 2,195 | 40,336 | + 31,513 |

**Spatial Analysis: Existing Conditions vs. Proposed General Plan**

Portions of the project area where future development could be expected, if the proposed project is approved, can be identified by comparing the Proposed General Plan Land Use Diagram (MEA Figure 2.4) with the Existing Land Use Map (MEA Figure 2.1). Existing vacant, agricultural, and citrus lands which are being converted to urban uses contribute the largest acreage to potential development. Under the proposed General Plan, areas of potential future growth, by Planning Sector, are discussed in general terms as follows. The above referenced maps should be consulted for detailed changes.

- **Northwest Redlands** Industrial, commercial, and office growth in the East Valley Corridor Specific Plan on lands almost exclusively in agricultural and citrus production today but which have already begun transition to urbanized uses.

- **West Redlands** Industrial, commercial, and office growth in the East Valley Corridor Specific Plan on lands presently a mixture of vacant, underdeveloped residential, agricultural and citrus uses. As in northwest Redlands, conversion of these lands to urban uses has already begun.

- **North Redlands** Residential growth on lands near the Santa Ana Wash currently in agricultural and citrus production. The southern portion of this sector is predominantly residential in character.

- **Mentone** Residential growth on infill lands presently containing mixed vacant, residential, and citrus parcels. Consolidation/intensification of commercial and industrial uses on infill parcels along Mentone Boulevard (Hwy 38) commercial corridor and Wabash Avenue. Residential infill has already begun in this area which is presently under County jurisdiction.

- **Crafton** Low intensity residential growth (Rural Living category) on lands predominantly in Citrus production and on properties adjacent to the Crafton Hills (Very Low Density Residential category).

- **South Redlands** Residential infill to reinforce mature neighborhoods with some development of vacant land blocks within this upscale, largely residential area. Infill and redevelopment of commercial, industrial, and office uses on underdeveloped and vacant parcels in and adjacent to the downtown core.

- **San Timoteo/Live Oak Canyon** Low intensity residential growth with preservation of moderate and steep slopes within the canyon on lands presently vacant. Residential development of some existing citrus and agricultural production areas.

In general, where existing viable residential neighborhoods are concerned, proposed land use designations have been configured to maintain existing permitted densities. Where neighborhoods are deteriorating and/or have already begun transition to more intensive uses, nonresidential or higher density residential designations have sometimes been applied (i.e., residential uses surrounding the downtown core).

For more detailed topical discussion of the environmental impacts of increased development within the Planning Area, see Section 4.0 (Open Space), Section 5.0 (Seismicity, Geology, Soils), Section 6.0 (Agricultural Lands), Section 7.0 (Hydrology), Section 8.0 (Biotic Resources), Section 9.0 (Mineral Resources), Section 10.0 (Climate, Air Quality, Wind), Section 11.0 (Historic, Archaeologic, Paleontologic Resources), Section 12.0 (Visual Quality), Section 13.0 (Traffic and Transportation), Section 14.0 (Airport), Section 15.0 (Noise), Section 16.0 (Community Service), Section 17.0 (Energy), and Section 18.0 (Electromagnetic Fields) contained within this EIR.

**Spatial Analysis: Existing General Plans vs Proposed General Plan**

The proposed General Plan Land Use Map for the project area differs spatially from the existing City and County General Plan maps to varying degrees depending upon location. An understanding of the differences between the proposed General Plan and the existing General Plans land use diagrams can be determined by overlaying the proposed General Plan diagram, MEA Figure 2.4, and the existing General Plan maps shown in MEA Figure 2.1, Existing Land Use, and MEA Figure 2.2, General Plan Land Use. The following paragraphs provide a general comparison of the two sets of maps by Planning Sector.

- **Northwest Redlands** The Northwest planning sector is under both City and County jurisdiction. All lands within the Northwest Redlands Planning sector are also within the East Valley Corridor Specific Plan (EVCSP). Both the existing City and County General Plans as well as the proposed General Plan recognize and implement the EVCSP land use designations in this sector. Consequently, while the three plans may use different terminology (Urban Services vs. Commercial-Industrial vs. EVC Planned Development), the General Plan update does not vary substantially from either the EVCSP or the existing General Plans in terms of effective land use designations.

- **West Redlands** The West Redlands planning sector lies completely within the incorporated City limits and largely within the East Valley Corridor Specific Plan. Both the existing General Plan and the proposed General Plan reflect the EVCSP land use designations in this area and, consequently, no substantive changes are proposed.

- **North Redlands** The North Redlands planning sector lies entirely within the incorporated City limits. Key changes in this area include the designation of approximately 850 acres of land from the existing "Urban Reserve" category to other specific land use designations including agriculture (±200 acres), very low density residential (±550 acres), and low density residential (±100 acres). There are also some localized areas of residential intensification from medium density (max 15 du/ac) to high density (max 27 du/ac) in the vicinity of the University of Redlands and from low density (max 6 du/ac) to medium density (max 15 du/ac) along Lugonia Avenue. Much of this sector also contains existing residential development and, where viable neighborhoods occur, land use designations and densities consistent with existing General Plan categories and existing development have been maintained. A Housing Conservation District is designated east of Orange Avenue between Lugonia Avenue and Colton Boulevard. Densities have been reduced from Medium Density (max 15 du/ac) to Low Density (max 6 du/ac) within this area.

- **Mentone** The Mentone planning sector occurs adjacent to the Santa Ana Wash and contains areas under both City jurisdiction (primarily south of the Santa Ana Wash) and County jurisdiction (primarily north of the Santa Ana Wash). The City General Plan includes significant amounts of General Industrial and Light Industrial designated lands as well as small amounts of Low Density

Residential adjacent to Highway 38. The County General Plan designations include Rural Living (RL-5, RL-10) with 5 and 10 acre minimums respectively, commercial (CG) and medium density residential adjacent to Mentone Boulevard, as well as a large area of Planned Development (PD) designation corresponding to the previously proposed 2,900 unit "Sunrise Ranch" project, a 995 acre Planned Unit Development. North of the Santa Ana Wash, the proposed General Plan calls for the Rural Living designation that would allow residential development on 2.5 to 5 acre lots over the majority of the County area, a significant reduction in allowable density from the County's PD designation. Areas of over 30% slope areas are designated Resource Conservation while the Santa Ana Wash is designated Flood Control. A potential park and school site are also shown in this area. South of the wash, the amounts of Agricultural and Flood Plain designation have been increased while industrial, commercial, and medium density residential designated lands have been reduced.

- **Crafton** The Crafton planning sector is primarily within the unincorporated County and contains large areas of citrus groves designated Rural Living (RL-5) with 5 acre minimum lot size. This sector also designates portions of the Crafton Hills as Rural Living (RL-40) with 40 acre minimum lot size. The County also includes an area of Planned Development District corresponding to the previously proposed Marlborough Development "Sterling on the Green" project. The proposed General Plan is consistent with much of the County land use, by maintaining the Rural Living designation over the existing citrus groves with a increase in allowable density from 5 acre to 2.5 acre minimum lots, placing the Resource Conservation designation (intended to preserve steep slopes) on portions of the Crafton Hills with greater than 30% slope, and proposing Very Low Density and Low Density residential development in the areas currently designated PD on the County plan.

- **South Redlands** The South Redlands planning sector lies completely within the incorporated City limits and contains the historic downtown core, much of the City's Victorian homes, and the upscale neighborhoods and custom homes generally bounded by Highland Avenue, Sunset Drive and the I-10 Freeway. Key changes from the existing General Plan include the redesignation of residential areas east of downtown to commercial-industrial uses (these neighborhoods have already begun converting to office and industrial uses), application of a Housing Conservation District over the medium density neighborhoods south of downtown, localized instances of residential intensification largely in recognition of existing higher density development in the vicinity of major streets including Redlands Boulevard and Barton Road, and designation of some residential lands along Highland Avenue between Redlands Boulevard and Wabash to agricultural uses. Land use designations and densities consistent with the existing General Plan have been maintained within the area of Sunset Drive and the Freeway because of existing neighborhoods located there. In general, because this planning sector is largely developed, any changes between the existing and proposed general plans are relatively localized and do not involve large acreages.

- **San Timoteo/Live Oak Canyon** The San Timoteo/Live Oak Canyon planning sector is completely within the incorporated City limits and contains the lands annexed to the City under the Southeast Area Plan (SEAP). The existing General Plan diagram designates this area with large blocks of the "Urban Reserve" and "Hillside Residential" designations. The proposed General Plan retains a residential orientation for this area but also incorporates more precisely the requirements of the SEAP by depicting lands containing greater than 30% slope with the "Resource Conservation" (RC) designation. The RC designation is oriented toward preservation of steep slopes, allowing only limited residential development. The remainder of this planning sector is designated predominantly as "Very Low Density Residential" on properties with slope of less than 30%. Application of the City's slope density formula determines allowable densities in VLDR areas. In addition, while the SEAP was located only within a portion of this sector, the principles inherent in the SEAP as to preservation of significant ridgelines and areas of steep slope have been extended to the entire San Timoteo and Live Oak Canyon areas as reflected by the

application of the RC designation throughout the canyon areas.

In general terms, the proposed General Plan diagram maintains many of the land use relationships found on the City's existing General Plan by preserving significant ridgelines and reducing residential densities in areas of steepest slope through application of the RC (Resource Conservation) designation. It also reflects a slight reduction in overall density/intensity over the existing general plans currently in place.

Over the entire Planning Area, residential uses under the proposed plan would be reduced by roughly 1,456 acres or 9% below that of the existing General Plans.

Commercial, industrial, and office uses identified by the proposed plan would be decreased by approximately 2,879 acres or 50% below that of the existing General Plans. This reduction is largely due to decreased industrial in the north Mentone area as shown on the existing City General Plan.

Public Institutional uses under the proposed General Plan would be reduced by approximately 85 acres, or 5% below those proposed in the existing General Plans.

Open Space uses under the proposed General Plan would be increased by roughly 3,420 acres, or 52% over those proposed in the existing General Plans.

**Land Use Impacts and Mitigation Provided by Land Use Diagram**

The General Plan diagram establishes the general pattern of land use throughout the Redlands Planning Area. Key elements which determine the layout of land uses and which are intended to promote orderly patterns of development include the following:

- Existing viable residential neighborhoods have been designated with residential land uses intended to maintain existing densities.
- Existing Public facilities such as museums, schools, post offices, fire stations, landfills, and airports have been designated as "Public-Institutional".
- Areas of existing manufacturing use are maintained through application of the "Light Industrial" designation.
- Preservation of existing citrus groves are encouraged by application of the "Rural Living" and "Agricultural" designations.
- Preservation of lands in excess of 30% slope is encouraged by application of the "Resource Conservation" designation.
- Major flood impacted areas such as the Santa Ana Wash and San Timoteo Canyon are designated "Flood Control".
- Consistency with the East Valley Corridor Specific Plan and Downtown Redlands Specific Plan is maintained through use of the "Commercial", "Industrial", and "Commercial-Industrial" designations.
- Provisions to allow the retention of existing higher density housing while protecting the viability of lower density historic neighborhoods is achieved through the application of a "Housing Conservation" overlay.
- Recreational needs of residents are recognized and accommodated through the designation of existing and potential parks and linear park elements.

**Land Use Impacts and Mitigation Provided by Plan Policy**

Buildout of the proposed General Plan could potentially create conflicts between adjacent land uses, both within the project area and adjacent to the project in surrounding jurisdictions. General Plan standards are typically established for the purposes of assuring compatibility among land uses under the premise that impacts potentially extend beyond project boundaries and effect adjacent jurisdictions.

Internal consistency issues have been addressed by the proposed General Plan, including those which affect the character and quality of the community, the distribution of land uses, the intensity and types of housing, the distribution and intensity of potentially invasive uses, and the provision of parks and recreational facilities. Other chapters with policies which serve to prevent land use impacts are listed in the following paragraphs.

> The Land Use Element of the Redlands General Plan will set the future direction for land uses in the City. While the land use diagram described previously will serve as the primary spatial element for controlling future development in the City, the Plan also contains Guiding and Implementing Policies which prevent land use incompatibilities and conflicts from occurring. The Land Use Element is contained in Section 4.0 of the General Plan with Guiding and Implementing Policies for all major land use categories as well as special development areas within the City.

1. Growth Management Element policies 2a, 2c, 2d, 2e relating to:
   - maintaining density consistent with the General Plan
   - provision of services concurrent with development
   - encouragement of annexations in the Planning Area
   - orderly growth and agricultural protection

2. City Design Element policies 3.10e, 3.10j, 3.23d, 3.30a, 3.30b, 3.30c relating to:
   - preservation of steep hillsides
   - maintaining rural feel in Southern Hills and Canyons
   - sensitive residential-nonresidential interface in mixed use historic zones
   - preservation of existing neighborhoods

3. Circulation Element policies 5.20f, 5.31b, 5.70b relating to:
   - monitoring for unacceptable LOS in East Valley Corridor and corrective action including intensity reduction and land use changes for vacant properties
   - location of high traffic generating land uses near arterials
   - maintaining compatibility of Redlands airport operations with surrounding land uses

4. Housing Element policies 6.lc, 6.1n, 6.7e relating to:
   - geographic dispersal of low income housing
   - retention of existing mobile home parks
   - distribution of neighborhood services

5. Open Space Element policies 7.10a, 7.10b, 7.10c, 7.10f, 7.10j, 7.10g, 7.11r, 7.41d, 7.42c relating to:
   - provision of park and open space systems
   - Santa Ana bluff land use dedications
   - Zanja linear park land use dedications

6. Health & Safety Element policies 8.14a-f, 8.40b-c, 8.50a-d, 8.50i-k relating to:
   - reduced air pollution through land use location and jobs housing balance
   - preservation of unmitigable flood hazard areas through open space and recreational uses
   - development restrictions near active faults
   - development restrictions in areas of steep slopes and unstable soil conditions

7. Noise Element policies 9b, 9l, 9u relating to:
   - noise sensitive land use planning
   - noise monitoring program
   - acoustical studies for certain new developments

8. Economic Development policies 11b, 11i, 11l, 11o relating to:
   - provision of adequate amounts of appropriate commercial development
   - appropriate surrounding land use to sustain long term use of Redlands Airport

External issues of adjoining jurisdictions have been addressed by the Proposed General Plan through policies which require the coordination between the City of Redlands and surrounding jurisdictions or with agencies who have responsibility over the general area on mitigating impacts to surrounding areas. In implementing these policies, impacts can be reduced within the Planning area and surrounding jurisdictions. For example, the following policies in the General Plan are intended to mitigate impacts to surrounding jurisdictions:

Policy 4.40x of the Land Use Element requires review and comment on new development proposals when routed by adjacent jurisdictions through the environmental review process to identify and avoid potential land use conflicts.

Policy 5.30g of the Circulation Element requires coordination with the City of Loma Linda and SANBAG to resolve the alignment of San Timoteo Canyon Road in the vicinity of Barton Road at the common boundary between the two cities.

Policy 5.30h requires coordination with the City of Yucaipa to align the proposed Crafton Hills Drive between Wabash Avenue and Sand Canyon Road.

Policy 7.21o of the Open Space Element in the General Plan requires coordination between the cities of Redlands and Yucaipa on habitat preservation to reduce impacts to biotic resources along Yucaipa Creek and in Live Oak Canyon.

Policy 7.22h Open Space Element requires the coordination between the City of Redlands and other water companies in educating the public in conservation measures.

Policy 8.11b of the Health and Safety Element requires the coordination with other jurisdictions in San Bernardino County to establish and integrate parallel or related air quality plans, programs, and monitoring and reporting.

Policy 8.11i of the Health and Safety Element requires the joint establishment of a communication network with key elected officials and staff involved in air quality planning in Los Angeles, Orange and Riverside counties as the basis for identifying and implementing parallel measures of mutual benefit.

Policy 8.12s of the Health and Safety Element requires that the City of Redlands, jointly,through the County, SANBAG, and SCAG, participate with adjacent counties in expanding High Occupancy Vehicle (HOV) lanes on the freeway system within those counties.

Policy 8.20a of the Health and Safety Element requires the City of Redlands to work with local and

regional water agencies to improve and enhance groundwater quality in the region.

Policy 8.40e of the Health and Safety Element requires the coordination with the U.S. Army Corps of Engineers and San Bernardino County throughout construction, mitigation, and operation of the Seven Oaks Dam, improvements to the Mill Creek levees, and the San Timoteo Canyon flood improvements.

Policy 8.90e of the Health and Safety Element supports initiating planning for the long term recovery from disaster and coordination with on-going planning efforts in San Bernardino County.

**Additional Land Use Mitigation and Unmitigable Impacts**

The proposed General Plan land use diagram and plan policies cited above are anticipated to provide adequate mitigation to potential land use conflicts and no further land use measures are deemed necessary. Consult the relevant section of this EIR for discussion of related environmental issues and topics.

**Mitigation Measures**

None Required.

# 4.0 OPEN SPACE

Redlands General Plan / EIR

## 4.0 OPEN SPACE

**Setting.** Open space within the Planning Area falls into four General Plan categories. The Parks/Golf Courses category includes public and private facilities of park-like character. Agriculture, the next category, covers areas suitable for growing citrus, avocados, kiwis, Christmas trees, and similar crops. Flood Control/Construction Aggregates Conservation/Habitat Preservation includes areas subject to the 100-year flood, areas designated for potential mineral resource extraction, and areas to be preserved as habitat. The last category, Resource Conservation, includes those portions of the Planning Area which exceed 30 percent slope or are accessible only by traversing slopes exceeding 30 percent, some of which might also have habitat value. Total open space acreage within the Planning Area (exclusive of rail and freeway rights-of-way) is about 7,000 acres, comprising 24 percent of the acreage of the Planning Area. Vacant parcels which do not fall under the four General Plan categories listed above comprise approximately 12,000 acres which is about 41 percent of the Planning Area. For a full discussion of existing conditions, consult MEA Section 3.0, Open Space.

### Open Space Impacts and Mitigation Provided by Plan Policy

The Plan proposes the conversion of about 9,130 acres (14.4 square miles) of existing open space to urban uses. "Urban uses" include parcels designated Very Low, Low, Low-Medium, Medium or High Density Residential, Office, Neighborhood/General Commercial, Commercial Industrial, Light Industrial, or Public/Institutional. Loss of open space is anticipated to include loss of agricultural lands, loss of former flood plains, and loss of habitat areas. Open space under the proposed General Plan is shown in EIR Table 4.1, Open Space Under Proposed General Plan, and may be compared to MEA Table 3.1, Vacant and Open Space Lands Under Existing Conditions, which describes existing vacant and open space lands.

**EIR Table 4.1**
**Open Space Under Proposed General Plan**

| | |
|---|---|
| Park | 901 acres |
| Agriculture | 622 acres |
| Flood Control | 4,413 ares |
| Resource Conservation | 3,956 aces |
| Open Space | 150 acres |
| Total | 10,042 acres |

Source: ESRI

Since the "open space" category overlaps with so many topical sections within the Environmental Impact Report (EIR), the impacts of open space conversion and Plan policy mitigation are discussed in detail in these other sections. These include EIR Section 6.0 (Agricultural Lands), EIR Section 7.1 (Flooding), EIR Section 8.0 (Biotic Resources), EIR Section 9.0 (Mineral Resources), and EIR Section 16.3 (Parks). The regional loss of open space is discussed further in EIR Section 20.0 (CEQA Topics), under Cumulative Impacts.

### Additional Open Space Mitigation and Unmitigable Impacts

While numerous policies throughout the General Plan are intended to minimize the environmental impacts of urbanization and to preserve open space, loss of open space cannot be entirely avoided and is deemed an unavoidable significant adverse impact. Additional mitigation and unmitigable impacts related to open space are also discussed in EIR Section 6.0 (Agricultural Lands), EIR Section 7.1 (Flooding), EIR Section 8.0 (Biotic Resources), EIR Section 9.0 (Mineral Resources), and EIR Section 16.3 (Parks).

# 5.0 SEISMICITY, GEOLOGY AND SOILS

.Redlands General Plan / EIR

# 5.0 SEISMICITY, GEOLOGY, AND SOILS

**Introduction**. The geologic history of the Redlands area is important to understand and consider for planning purposes because there are several direct cause-and-effect relationships between the geologic formation of the region and the resulting seismic and geotechnical hazards. These hazards can be best evaluated by understanding how and why they formed. The geologic forces that produced the mountains and valleys that define the Redlands area also produced features that pose hazards to the people living in this area. Many of these hazards can be specifically addressed and evaluated in terms of their impact on future planning in the Redlands area.

**Setting**. The geology of the Redlands Planning Area forms an extremely important part of the physical development of the region, its unique attractions, and its specific hazards. The Redlands area lies within the San Bernardino Valley, which is the lowland area lying south of the San Bernardino Mountains and north of the hills and mountains of the Peninsular Ranges. This valley is actually very young and is a direct product of the merging of two major fault systems, the San Andreas and the San Jacinto. Interaction of these two faults produced the valley by disrupting the existing hard rocks and offsetting the Redlands area from its original position adjacent to the Chocolate Mountains near the Salton Sea. During this offset, sediments were dumped from the topographic highs (mountains) to fill the lows (valleys) and developed geologic units such as the San Timoteo badlands. Soils of different ages and compositions have developed on the hard bedrock units, the San Timoteo formation and other related sedimentary units, and on the younger alluvial units situated within the valley floor. These soils form a thin layer over the underlying geology and pose certain hazards themselves, such as erosion and slope instability. Also, the nature and topographic position of the geology and soils contribute to the presence of certain geologic and geotechnical hazards, some of which are mitigatable through appropriate engineering studies and practices, others that probably would be best resolved by maintaining the area as open space.

Several active, potentially active and non-active faults either transect or are in close proximity to the Planning Area. Active faults, as defined by the California Division of Mines and Geology (CDMG), for inclusion in Alquist-Priolo fault rupture hazard zones that traverse the Planning Area include the San Andreas and San Jacinto. Potentially active faults that transect the Planning Area include: 1) the western fault segments of the Crafton Hills fault system, known locally as the Redlands and Reservoir Canyon-Crafton Hills faults, 2) the southwesterly extensions of the eastern fault segments of the Crafton Hills fault system known as the Chicken Hills and Western Heights faults 3) the Loma Linda fault, and 4) the Greenspot fault. The latter two faults are considered segments of the San Jacinto and San Andreas fault zones. The above fault segments or faults are not presently zoned for Alquist-Priolo earthquake fault zone studies. However, based on current studies, they should be considered active, or at a minimum, potentially active. The western extent of the Banning fault and the Vincent thrust fault, occur in the San Timoteo Badlands and northern portion of the Crafton Hills, respectively. These faults are considered part of older fault systems and are not considered to be active or potentially active by the CDMG. The San Andreas and San Jacinto fault zones are seismically active and are capable of generating strong ground shaking throughout the Planning Area. The 30 year probability for Magnitude 6.9 and 7.3 earthquakes on the San Jacinto and San Andreas faults within the Planning Area is 37 and 28 percent, respectively. Maximum horizontal ground accelerations from these 30 year probable earthquakes are anticipated to substantially exceed 0.4g, which is the current maximum Uniform Building Code design value. For a complete discussion of existing geologic, soils and seismic conditions, consult MEA Section 4.0, Geology, Soils and Seismicity.

## 5.1 Geology and Soils

### Principal Geotechnical Impacts and Constraints

The geology of the Planning Area is somewhat complex and when combined with steep slopes, can create potential geotechnical hazards or constraints. Of the 33,100 acres within the Planning Area, about 4,213 acres are slopes of 15-30 percent, and about 3,690 acres are slopes of over 30 percent. Those portions of the Redlands Planning Area that have slopes steeper than 15 percent are subject to erosion of both soil and rock. Other geologic and geotechnical hazards which may limit development opportunities in the Planning Area include: Slope instability, such as natural and man-made landslides, rockfall, mud/debris flow and soil creep; subsidence

(groundwater withdrawal); expansive soils; compressible/collapsible soil, such as water induced ground collapse; percolation potential/effluent disposal; and, blasting (noise) impacts. For a complete discussion of each of the above geologic or geotechnical hazards, consult MEA Section 4.1.3, Principal Geotechnical Hazards (Impacts) and Constraints.

**Geologic and Geotechnical Mitigation Provided by Plan Policy**

To reduce erosion and slope instability risks in hillside areas, the General Plan proposes to limit development on slopes with certain soil types (i.e., Saugus Soils), slopes greater than 30 percent, and continued regulation of grading and density for development on slopes greater than 15 percent. The General Plan Diagram shows development on parcels that contain slopes of over 30 percent (about 3700 acres within the Planning Area), and parcels that contain slopes between 15 and 30 percent (about 4,200 acres). Plan Policy 8.50i limits development on slopes exceeding 30 percent and requires detailed soil and geological evaluation of these areas. The generalized Plan Diagram does not depict small areas of land over 30 percent. Steep land measured by the computer may be included within developable parcels, so the data must be regarded as approximate. The General Plan also proposes development on parcels that contain Saugus Soils (about 861 acres within the Planning Area). General Plan Policies encourage transfer of dwelling units to flatter portions of the site and away from soil or geologic hazards.

Furthermore, to assist with erosion and landslide mitigation, General Plan Policy 8.50j considers amendment of the Zoning Ordinance to include restrictions for soil types similar to the Saugus sandy loam series. All soils subject to moderate to very high erosion, and suggested for inclusion in the amendment to Ordinance 2030, are depicted on MEA Figure 4.1, Regional Generalized Geologic Map.

Mitigation of soil erosion during construction is provided by General Plan 8.50l through suggested implementation of a Project Erosion Control Plan required by Policy 8.20o. Mitigation of other geotechnical hazards is provided by General Plan Policies 8.50a, 8.50b and 8.50k. In general, these Policies provide for a geotechnical investigation by a registered civil engineer of the specific improvement locations within the Planning Area. This investigation is considered necessary to evaluate the nature of site materials, develop appropriate grading recommendations, and assist with development of design parameters. Geotechnical and/or engineering geologic investigations may not be recommended in those project areas where the surface topography is not anticipated to be altered, such as open space areas. These investigations can identify erodible, expansive and collapsible soils, existing or potential landslides, areas with unsuitable percolation characteristics for placement of on-site sewage disposal systems, large scale subsidence, non-rippable bedrock areas, or other geotechnical concerns and make recommendations for mitigating any potential adverse affects. As an example, geotechnical recommendations for selective grading or overexcavation and recompaction is anticipated to mitigate the potential for soil collapse, hydroconsolidation, or expansive soil concerns.

Currently, the General Plan specifies the continuation of the preparation of soils investigations following the discovery of the presence of critically expansive soils or other soil problems and, if inconclusive, specifies the continued requirement of the preparation of a written geologic report prepared by a certified engineering geologist.

Plan policies additionally specify project-specific investigation and mitigation of geologic and seismic hazards, where necessary, and support for the implementation of relevant San Bernardino County General Plan policies.

## 5.2 Faulting and Seismicity

### Principal Faulting, Seismicity Impacts and Constraints

The Planning Area contains a total of about 1,500 acres within the Alquist-Priolo Zones, comprising about 4.5 percent of the Planning Area. Many of the seismic and faulting hazards which exist throughout the Planning Area - particularly in steeper areas - are a result of potential earthquake activity and include: ground rupture, strong ground motion or shaking, liquefaction, secondary seismic hazards (i.e., differential compaction, lateral spreading and settlement), rockfall and landsliding, and earthquake induced flooding. For a complete discussion of each of the above faulting and seismic related hazards, consult MEA Section 4.2.3, Principal Seismic Hazards (Impacts) and Constraints.

### Faulting and Seismicity Mitigation Provided by Plan Policy

The General Plan does not propose new occupation astride any known, active faults as defined by the CDMG. Additionally, Policies within GP Section 8.1 ensure restricted development within Alquist-Priolo Earthquake Fault Zones. New development proposed in the vicinity of Alquist-Priolo Earthquake Fault Zones is expected to cover about 610 acres.

The General Plan proposes occupation adjacent to several fault zones as depicted on MEA Figure 4.6 (also shown on GP Figure 8.1), including in the vicinity of the San Andreas fault in the northeastern portion of the Planning Area (passing through the Sunrise Ranch (Greenspot) development in the Mentone Planning Sector), and in the vicinity of the inactive Banning fault in San Timoteo Canyon. No development under this General Plan is proposed adjacent to the Alquist-Priolo Earthquake Fault Zone portions of the Western Heights fault and the Chicken Hill fault which run parallel to and southeast of the Crafton Hills. However, the southwesterly extension of these faults which have not been classified for Alquist-Priolo Earthquake Fault Zones will be reviewed as per Policy 8.50d.

New development is proposed on or within 500 feet either side of other active/potentially active faults in the Planning Area, including the Redlands fault, Reservoir Canyon/Crafton Hills fault, Loma Linda fault and the Greenspot fault. ( New development includes parcels designated Very Low, Low, or Medium Density Residential, Office, Neighborhood/General Commercial, Commercial/Industrial, Light Industrial, or Public Institutional.) As explained in MEA Section 4.2, Faulting and Seismicity these faults including the southwesterly extension of the Chicken Hills and Western Height faults, are considered to be either active or potentially active based on recent studies and mapping performed by the USGS. Currently, site specific investigations are generally lacking in sufficient detail that might allow the above faults to be classified by the Fault Evaluation Program of the State Division of Mines and Geology as Earthquake Fault Zones, under the Alquist-Priolo Earthquake Fault Zone Act.

General Plan Policies 8.50a, b, c and d include the requirement for geologic studies to evaluate, and possibly investigate, proposed projects within 500 feet from the above faults as depicted on GP Figure 8.1.

In the event of a significant earthquake on the nearby San Jacinto or San Andreas faults, residents throughout the Planning Area would experience the effects of strong ground shaking. To protect against the impacts of ground shaking, General Plan policies enforce continuation of the building inspection program, systematic upgrading of seismically unsafe buildings, and development of a City-based public awareness/earthquake preparedness program, coordinated with the County geologic educational program. Based on ground motion information collected from southern California earthquakes within the last five years, and in anticipation of seismic design code changes, consideration should be given for additional General Plan Policies to: 1) require submittal of geologic information by certified engineering geologists and seismic information by qualified registered geologists and geophysicists, for any discretionary project or development proposal in an earthquake-hazardous area. The reports are to be prepared in accordance with State Guidelines or stricter standards for any discretionary project or development proposal subject to earthquake induced hazards and, 2) encourage updating of the Uniform

Building Code (UBC) to incorporate the most current seismic design standards and hazard reduction measures from the Applied Technology Council (ATC), the Structural Engineers Association of California (SEAOC) and the Earthquake Engineering Research Institute (EERI).

Policies in GP Section 8.50 specify monitoring studies related to induced seismicity, and protective action if a conclusive relationship is established between reservoir drawdown, refilling, and seismic activity.

Areas identified as having a low to high potential for liquefaction are required under the General Plan to undergo geotechnical study prior to development, and are subject to subsequent site-specific mitigation or preservation as open space. Such areas, as identified on the County Geologic Hazard Overly map and MEA Figure 4.2, Generalized Geologic Map, show the Santa Ana River Wash and portions of adjacent areas as having a high potential for liquefaction on a generalized basis.

General Plan Policy 8.50 provides for geologic and seismic hazard investigations. Specifically, General Plan Policy 8.50e includes geotechnical studies addressing secondary seismic hazards, such as differential compaction, lateral spreading, settlement, rockfall and landsliding.

Consideration should be given to developing guiding policies to identify critical facility, hazardous structures and potential hazardous materials incidents related to seismic hazards through development of a Redlands Planning Area Seismic Safety component of the Emergency Management Plan.

Because the General Plan proposes increasing population and jobs within the Planning Area over the next 15 years, and since the Planning Area is part of the seismically active Southern California region, despite all of its preventive policies, the General Plan may result in the exposure of people or structures to unanticipated or unmitigable seismic hazards. To the extent that commonly accepted seismic regulation provides protection, General Plan policies cited above and additional policies listed below which have been added to the General Plan, are anticipated to provide adequate mitigation.

1. Policy 8.50c "Continue to restrict development within Alquist-Priolo Earthquake Fault Zones. and other active/potentially active faults which have not yet received Alquist-Priolo classification."

2. Policy 8.50d "Consult with the Division of Mines and Geology if there are issues or questions concerning fault alignment. Evaluate and, if necessary, perform site specific investigation for development proposed on or near Alquist-Priolo Earthquake Fault Zones as well within 500' of other active/potentially active faults as depicted on GP Figure 8.1."

3. Policy 8.50e "Require areas identified as having significant liquefaction potential (including secondary seismic hazards such as differential compaction, lateral spreading, settlement, rockfall, and landslide) to undergo geotechnical study prior to development; mitigate the potential hazard to a level of insignificance; if mitigation is not possible, preserve these areas as open space or agriculture.

4. Policy 8.50g "Use the building inspection program to inventory and evaluate earthquake hazards in existing buildings using the most current seismic design standards and hazard reduction measures, and continue the program for the systematic upgrading of seismically unsafe buildings. Continue to explore measures to induce building owners to upgrade and retrofit structures to render them seismically safe.

5. Policy 8.50k "For new construction and exterior building expansions including multi story additions or lateral expansions as deemed appropriate by the City Building Department, require the preparation of a geotechnical/soils/geologic report by a registered civil geotechnical/soils engineer and a certified engineering geologist. This report shall address erodible, expansive and collapsible soils, existing or potential landslides, areas with unsuitable percolation characteristics, large scale subsidence, non rippable bedrock areas, ground motion parameters, active/potentially active faulting, liquefaction, and any other geotechnical concepts as appropriate and make recommendations for mitigating any potential adverse impacts.

6. Policy 8.50m "Adopt revisions of the Uniform Building Code which incorporate the most current seismic design standards and hazard reduction measures recommended by the Applied Technology Council (ATC) the Structural Engineers Association of California (SEAOC), the Earthquake Engineering Research Institute (EERI), the Seismic Safety Commission, and the Southern California Earthquake Center."

7. Policy 8.50n "Ensure that the Emergency Management Plan addresses seismic hazards, including hazardous materials incidents, hazardous buildings, critical facilities (i.e., schools, hospitals), emergency response preparedness and recovery with consideration to evacuation routes, peak load water supply requirements and minimum road width/clearance around structures.

## 5.3 Additional Seismicity, Geology, and Soils Mitigation and Unmitigable Impact

Based on the information presented above, no additional mitigation measures are necessary. In addition, no unmitigable impacts are anticipated as a result of General Plan implementation.

# 6.0 AGRICULTURAL LANDS

Redlands General Plan / EIR

## 6.0 AGRICULTURAL LANDS

**Setting.** Agriculture, mainly citrus, occupies 20 percent of the Planning Area. Citrus provided the original economic base for Redlands and remains a viable crop. Like virtually all agriculture, it is difficult for citrus to compete for space against urban uses. Redlands' oranges are of exceptional quality, relatively low-cost irrigation water is available, and there is less frost danger than at most other citrus-producing areas in California. Citrus preservation is widely supported in Redlands, although most growers are wary of measures that would limit their ability to eventually convert their land to urban use. Issues addressed during the General Plan revision process were the amount and location of agricultural land to be preserved and the means of preservation purchase, regulation, incentives, or a combination of the three. For a full discussion of existing conditions, consult MEA Section 5.0, Agricultural Lands.

**Agricultural Lands Impacts and Mitigation Provided by Plan Policy**

Without strong agricultural land preservation policies, market forces at work until buildout would limit citrus lands to publicly owned parcels and a few estates. Other agriculture would probably be eliminated. Implementation of Plan policies as portrayed by the General Plan Diagram are intended to preserve the remaining citrus on 500 acres of Prime Agricultural Land, Unique Agricultural Land, and Agricultural Lands of Statewide Importance. Approximately 2.0 percent of the Planning Area's lands now categorized as Prime Agricultural Land, Unique Agricultural Lands, or Agricultural Lands of Statewide importance will be preserved as agriculture. Another 12 percent of these lands will be designated Rural Living, anticipated to encourage continued agricultural use of these parcels.

The following is a breakdown of the acreage of citrus to be converted to other uses under the Proposed Land Use Plan for the Redlands General Plan update. These are broken down into the same concentrations as those discussed under Section 5.0, Agricultural Lands, in the MEA.

It should be noted that while citrus and agriculture were discussed as separate topics in the previous General Plan, they are combined under one heading in this update. These two topics are combined under the heading of Agriculture in order to be consistent with the General Plan Map.

Crafton - There are currently 975 acres of citrus in this planning sector. The General Plan proposes all of this citrus to be converted to Rural Living which, although allows for residential uses, is anticipated to encourage continued agricultural uses.

Mentone - There are currently 1,216 acres of citrus in this planning sector. The General Plan proposes 797 acres of this citrus to be converted to Rural Living. The remaining 418 acres will be converted to other urban uses.

North Redlands - There are currently 765 acres of citrus in this planning sector. The General Plan proposes 376 acres of this citrus to be converted to Very Low Residential. The remaining 389 acres will be converted to other urban uses.

Northwest Redlands - There are currently 1,276 acres of citrus in this planning sector. The General Plan proposes 0.58 acres of this citrus to be converted to Very Low Residential. The remaining 1,275 acres will be converted to other urban uses.

West Redlands - There are currently 141 acres of citrus in this planning sector. The General Plan proposes all this acreage to be converted to other urban uses. None of this acreage is proposed under Rural Living or Very Low Residential.

San Timoteo Canyon - There are currently 346 acres of citrus in this planning sector. The General Plan proposes 302 acres to be converted to Very Low Residential. The remaining 44 acres will be converted to other urban uses.

Overall, approximately 500 acres of citrus within the Planning Area will be preserved under the land use designation of Agriculture.

Adoption of the Draft General Plan would not provide assurance that the Agricultural area shown on the General Plan Land Use Map will be preserved, however, policies in the General Plan are intended to preserve these lands to greatest extent possible. Guiding and Implementing policies in the General Plan aim at retaining the maximum feasible amount of agricultural open space for its contributions to the local economy, employing zoning for agricultural use, City ownership, transfer of density within the same ownership, and zoning for rural living to maintain citrus and other croplands in production where designated on the General Plan, and encouragement of land trusts to make the most efficient use of funds available for agricultural preservation. While continued urban expansion will create development pressures on agricultural lands, implementation of these policies will help reduce impacts to these properties.

**Additional Agricultural Lands Mitigation and Unmitigable Impacts**

Given the small remaining amount of citrus and other prime farmland in Southern California (excluding the low desert) and San Bernardino County, the loss that would result from implementation of the Redlands General Plan, including the *East Valley Corridor Plan*, must be classified as a significant adverse unmitigated impact. The Draft General Plan proposes to retain 622 acres in Agriculture and 2,617 acres in Rural Living. If maintained or planted in citrus, this would result in a 27 percent reduction in existing citrus acreage and is judged a significant impact. The availability of relatively low cost water for agriculture in Redlands, the high quality fruit produced, and the threat of the critical mass of the citrus economy that results from any decline in production make this conclusion unavoidable.

# 7.0 HYDROLOGY

Redlands General Plan / EIR

## 7.0 HYDROLOGY

**Setting.** Water issues continue to be a critical regional issue, and Redlands has its share of concerns over drainage, flooding, water supply, conservation, and quality. Human modifications to the natural Santa Ana River-related drainage system have generally provided flood protection for Redlands, although localized flooding occurs. The long-term imported State Water Project water supply is uncertain, due to a combination of political and environmental variables over which the City has little control. Local ground water is seriously contaminated in some portions of the Planning Area.

For a full discussion of existing conditions, consult MEA, Section 6.0, Hydrology. This section includes information on the existing hydrological conditions and resources. In addition, this section also contains references to hydrological studies, documents and plans from other development projects in the Planning Area.

### 7.1 Drainage and Flooding Impacts and Mitigation Provided by Plan Policy

Water quality impacts are considered significant if development substantially degrades water quality or contaminates the public water supply. Drainage impacts are considered significant if development occurs in areas that will flood during storms even if planned drainage systems are built. Flooding impacts are considered significant if the proposed project causes substantial flooding, erosion, or siltation.

Approval of the proposed land use plan will facilitate development within the City over the life of the plan. Development will include construction of roads, culverts, grading, and construction of structures. Land development can impact hydrology in three ways: 1) by increasing the rate and volume of runoff leaving the site and entering downstream properties; 2) by raising flood levels on properties adjacent to or within a floodplain; and 3) by causing flood waters to take a different route and adversely affect property which was not previously affected.

Future development facilitated by the General Plan could increase runoff, redirect it, result in higher peak flows and potentially be subject to flooding in flood hazard areas where insufficient flood control facilities have been constructed. Construction which would occur as a result of plan implementation would take place in some areas currently subject to the 100-year flood, as mapped by the Federal Emergency Management Agency (FEMA) on MEA Figure 6.4, Flood Zones.

These impacts can be reduced or avoided by use of retention basins to slow the rate of flow or by use of flood control improvements to ensure that the 100 year flood does not cause flooding which endangers public safety and damages property. Increased impervious surface reduces the amount of percolation to ground water and increases runoff. This can be mitigated by use of retention/detention basins to retain the increased flow until it can be safely released and soft bottomed channels which allow surface water to percolate to the underlying ground water aquifer. Increased runoff and increased peak discharge can result in increased water erosion which can be mitigated through retention basins, use of proper armoring of facilities and use of appropriate flow velocities. Increased peak discharge can overload the flood control system. All these potentially significant adverse impacts can be reduced to a level of insignificance through incorporation of the measures identified above.

The proposed land use plan identifies watercourses within which development is to be limited. Hydrology studies are required for proposed projects in these areas.

The guiding policies within the General Plan are designed to mitigate the types of potential impacts as they have been identified. Specifically, Policies 8.40a and 8.40b restrict development in areas subject to the 100-year flood unless adequate protection is provided. Policy 8.40c encourages the multi-use concept of flood zones, flood-related facilities, and waterways. The Biotic Resources Element of the General Plan has specific policies that deal with the treatment and utilization of flood channels and waterways.

Implementing policies within the General Plan are also designed to mitigate potential impacts. Policies 8.40h and 8.40i require the development of more comprehensive and detailed hydrology studies when deemed necessary by the Community Development Department. In addition these policies also require the preparation of a Master Drainage Plan for the entire Planning Area based upon buildout of the General Plan. Policies 8.40h through 8.40p require provision of improvements to mitigate flood hazards which, when implemented, will ensure the impacts to public health and safety will be reduced below a level of significance. Policy 8.40s requires coordination with other agencies to ensure compatible use of drainage facilities. The Circulation Element of the General Plan also contains policies that address the utilization of roadways to convey drainage and floodwater which will assist in the protection of public health, safety and property.

Policy 8.40q recognizes the necessity to protect the Earth's ozone layer and supports efforts to minimize or prevent the release of chlorofluorocarbons and similar gases. Policy 8.40r mandates the execution of emergency measures consistent with the City's Emergency Plan in the unlikely event of dam failure on the Seven Oaks or Bear Valley dams. Refer to the Emergency Management GP Section 8.90 of the Health and Safety Element for details pertaining to the City's Emergency Plan. In addition the Seismic, Geology, and Soils Section of the Health and Safety Element (GP Section 8.50) contains references to the stability of the Bear Valley and Seven Oaks dams.

No General Plan Policies specify the need to further investigate and address all-weather crossings of the major drainage courses in the Planning Area and the containment of 10-year events within developed roadway facilities. The following roadways are of concern in this regard: The Orange and Alabama Street crossings of the Santa Ana River, all roadways in the downtown Redlands vicinity in close proximity to the Mission Creek Zanja System, San Timoteo Canyon Road between Fern Avenue and the southern City limits. In addition, various roadways throughout the Planning Area are unable to contain a 10-year storm event within the limits of improved roadways. A focus of any future detailed hydrological study performed in the Planning Area, therefore, must be the analysis of all-weather crossings of local drainage courses and the containment of 10-year storm events between curbs of improved roadways. A Master Drainage Plan for the Planning Area is required by Policy 8.40h. All weather crossings should be analyzed as part of this study.

There is also the potential for drainage and flood-control improvements to adversely effect biotic resources in the Planning Area. Policy 8.40g in the Drainage and Flooding section of the Health and Safety Element (GP Section 8.40) ensures that flood control improvements do not disrupt environmentally sensitive areas. Policies 7.21k, 7.21l, and 7.21q in the Open Space and Conservation Element also address impacts of drainage and flood control improvements upon biotic resources.

#### Additional Drainage and Flooding Mitigation and Unmitigable Impacts

Based on the information provided above, no significant unavoidable adverse impacts are anticipated.

## 7.2 Water Supply and Conservation

**Setting**. The City of Redlands overlies the Bunker Hill Ground Water Basin. This basin is estimated to contain (1995) in excess of 5 million acre feet of water. However, actual useable waters from this basin are estimated at 2-3 million acre feet per year.[1]

The recharge sources for the Bunker Hill Ground Water Basin are Mill Creek and the Santa Ana River. Under current (1995) development conditions and during years of "average" or "normal" precipitation, the Mill Creek and Santa Ana River will adequately recharge the Planning Area's underlying ground water basin.

[1] Mike Huffstutler, City of Redlands, Municipal Utilities Department, Assistant Utilities Director.

However, during years of "below average" precipitation or "drought-like" conditions additional recharge sources are required to maintain the ground water basin at approximately 1995 levels and prevent an overdraft condition. During "drought" episodes the City may obtain State Water Project (SWP) waters to supplement Mill Creek and Santa Ana River sources in order to maintain adequate ground water levels.[2] The maximum yearly allotment of SWP water from which the Planning Area may draw from the SBVMWD is 102,600 acre feet. Actual amount delivered can vary from year to year depending on many factors. Refer to Section 6.3 of the MEA for a complete discussion of SWP waters.

Water is provided for agricultural use by approximately 18 mutual water and well companies. The Bear Valley Mutual Water District estimates that approximately 40,000 ac.ft/yr. of water are utilized for irrigation purposes. With 5,805.42 acres of existing agricultural uses in the Planning Area, current water demand on agricultural lands is estimated at 6.90 ac.ft/ac./yr.

The City of Redlands Municipal Utility Department estimates the per capita consumption rate of domestic water for residents in the Planning Area to be 300 gallons per day (gpd) or 0.3 acre feet per year (ac.ft./yr). This consumption rate includes all land uses (except water used for agriculture). Applying the consumption rate 300 gpd to the existing Planning Area population of 66,301, and the 1,855 residences outside the City limits yields a demand of approximately 20,446,800 gpcd.

**Water Supply and Conservation Impacts and Mitigation Provided by Plan Policy**

Appendix G of the CEQA Guidelines indicates that significant impacts on water supply can be expected if implementation of the proposed project:

- substantially depletes ground water resources;
- interferes substantially with ground water recharge; or
- encourages activities which result in the use of large amounts of water.

Primary potential impacts resulting from the proposed project are: increased consumption of ground water supplies; reduction in the infiltration of precipitation; and a decrease in water quality resulting from increased urban runoff, aquifer recharge, irrigation and the release of treated waste water in the Planning Area.

With development of the Planning Area as per the proposed General Plan Update, approximately 35,343 additional permanent residents will be generated, for a total project area population of 101, 644 at buildout. The City of Redlands, which has jurisdiction over the majority of the Planning Area, will be responsible for providing the bulk of the water. Applying the consumption rate of 300 gpd per resident to the projected permanent population of 35,343 generated by the Plan at buildout, results in an expected additional water demand of approximately 10,602,900 gpd or 11,876 ac.ft./yr. Total domestic water consumption at buildout is estimated to be 30,493,200 gpd or 34,156 ac.ft./yr.

The General Plan proposes 622 acres to be preserved in agriculture. Applying the estimated agricultural water demand of 6.9 ac.ft./ac./yr. to this acreage yields approximately 4,291 ac.ft./yr. Water demand on agricultural lands at buildout would be less than current demand. Impacts to agricultural water demand are considered less than significant. Overall, domestic and agricultural uses at buildout will yield a water demand of approximately 38,185 ac.ft./yr.

Any growth facilitated by the proposed project will not only increase consumption of ground water but will also reduce ground water recharge by creating impermeable surfaces, increasing runoff, and thus decreasing percolation. The various policies in the General Plan discussed below, focus on the continued

[2] Mike Huffstutler, City of Redlands, Municipal Utilities Department, Assistant Utilities Director.

provision by area water purveyors to adequately supply the City's water needs, the preservation of floodplains and natural drainage channels for percolation and ground water recharge, and the preservation of supplies through the use of recycled water and conservation measures.

Policy 7.22A recognizes the importance for the City to minimize its dependence on imported water by increasing entitlement in local surface waters, the implementation of wise ground water management practices, conservation measures, and the use of reclaimed waste water and nonpotable water for irrigation of landscaping and agriculture.

Policy 7.22b identifies the need to maintain and protect the Bunker Hill Ground Water Basin. Policy 7.22c identifies that although water resources and supplies are of regional and statewide concern, the planning and implementation of local water use can best be accomplished by the City of Redlands. Policy 7.22d identifies the need to conserve the highest quality of water available for domestic use.

In 1984 the City of Redlands, Department of Public Works, Water Division updated the 1981 Update of the original 1975 Redlands Water Master Plan. Since the 1984 update no official update of the Redlands Water Master Plan has been completed. However, Policy 7.22e of the Water Supply and Conservation Section of the Open Space and Conservation Element of the General Plan requires an update to the City of Redlands' Water Master Plan that will include an assessment of regional demand and availability of water resources through buildout, as well as a comprehensive ground water management program.

Policy 7.22f addresses the ultimate issue in relation to future development and adequate water supply. This policy states that if the City's Updated Water Master Plan shows water supply to be inadequate, a curtailment of future development will occur until adequate supplies are secured. Although this policy cannot mitigate impacts that could occur to a future "existing community" if severe drought conditions were realized, it would successfully regulate and mitigate water supply concerns in relation to future land development pressures associated with the proposed General Plan. The potential restrictions imposed by this policy could be universal, mandating no new service connections throughout the Planning Area, or restrictions could be area-specific.

Policy 7.22g recognizes the water conservation measures as specified in the Redlands' Water Conservation Plan, Ordinance No. 2151. Ordinance 2151 contains four levels of conservation, ranging from voluntary conservation measures to the most extreme level of water conservation which prohibits the issuance of new service connections and meters.

Policy 7.22h identifies the need for the City to coordinate with regional and local water companies and districts in an effort to educate the pubic and encourage participation in voluntary water conservation measures.

Other policies within the Open Space and Conservation Element that will have an indirect impact upon ground water recharge issues associated with water supply and conservation are those policies, 7.21d, 7.21e, 7.21i, 7.21k, and 7.21o, within the Biotic Resources Section that call for the preservation, restoration, protection and enhancement of riparian corridors. These corridors serve as percolation conduits of surface runoff waters into the ground water basin. In addition, Policy 7.21L calls for the City to encourage the U.S. Army Corps of Engineers to design "soft" channel and sediment basins when feasible. Natural channel designs will allow for normal ground water recharge.

Based upon the implementation of the policies discussed herein, the impacts upon water supply and conservation due to the General Plan Update can be considered mitigatable on a local level. However, as previously discussed, certain aspects of water supply and conservation on a regional level are beyond the control of the City. Regional impacts to water supply and conservation can result from the following circumstances:

- Political Conditions: The allocation of SWP waters are subject to change due to water rights of various water districts, water agencies and the general public.
- Economic Conditions: SWP waters can become cost prohibitive as regional demands increase.
- Environmental/Climatic Conditions: Severe drought conditions.

The conditions identified above can potentially affect the amount of useable water available to the Planning Area and in turn, cause a significant unavoidable adverse impact upon water supply and conservation. Although it is anticipated that recharge sources could maintain the current (1995) water levels of the Bunker Hill Ground Water Basin levels under buildout condition, State and regional political conditions, future costs of recharge sources and/or severe drought conditions could create a future water supply shortage resulting in overdraft conditions.

**Additional Water Supply Mitigation and Unmitigable Impacts**

Given the information above, no significant unavoidable adverse impacts are anticipated and no additional mitigation measures are required.

## 7.3 Water Quality

**Setting**. Prior studies have indicated that the Santa Ana River and Mill Creek water quality is quite good. The City of Redlands is entitled to a substantial amount of water from both of these sources. However, the City has historically had a problem with high nitrate levels in some of the local wells. This is mainly due to agricultural use of fertilizers. Other pollutants have also been detected in groundwater which have been over acceptable levels. These issues as well as impacts to water quality from urban runoff, potential septic tank contamination, and other potential impacts are discussed in the following section.

**Water Quality Impacts and Mitigation Provided by Plan Policy**

**Impacts from Urban Runoff**

Appendix G of the CEQA Guidelines indicates that water quality impacts are considered significant if development substantially degrades water quality or contaminates the public water supply.

General Plan implementation will intensify urban uses and increase impermeable surfaces within the Planning Area. The quality of ground water stored in the Bunker Hill Ground Water Basin is expected to be degraded to some extent by increased urban runoff, continued irrigation of the remaining fertilized citrus and other agricultural groves, irrigation of fertilized parks and golf courses, an increase of treated waste water released into the ground water supply, and the potential for spills of infectious, hazardous and toxic chemicals and waste.

Buildout of the proposed project will create increased urban runoff in the Planning Area. Pollutants associated with urban runoff typically include oils, fuels, minerals from roadway surface treatments, heavy metals, fecal coliforms, suspended solids, and certain cleaning agents. During storm events, it is estimated that 90% of contaminants on impervious areas of an urban watershed are removed by the first one-half inch of rain that occurs

within a six hour period.[3] This initial cleansing of the watershed is defined as "first flush". This contaminated urban runoff, along with "nuisance" runoff (contaminated water resulting from washing of automobiles and equipment, etc.) could find its way into surface supplies and, on a cumulative basis, cause a potential significant impact on local ground water quality in the long-term. Measures to reduce the amount of contaminated runoff from entering the ground water may be required. There is the potential for significant impacts on surface and/or ground water quality if the City and private developers do not meet Federal EPA requirements as outlined below.

The National Pollutant Discharge Elimination System (NPDES), is a Federal (40 CFR 122) program for the monitoring, permitting, treatment and enforcement of both point (i.e., sewer treatment plants, industrial waste discharges) and non-point (i.e., municipal storm water discharges) sources. As it applies to non-point sources, NPDES requires that certain types of development obtain NPDES permits for discharge into municipal storm drain systems. The City of Redlands and the Regional Water Quality Control Board administer the program within the City and its spheres of influence. Under this program, the development and implementation of Drainage Area Management Plans, which contain Best Management Practices (BMPs) aimed at controlling the discharge of pollutants to the maximum extent practicable, are required of certain development projects (i.e., projects with proposed grading over 5 acres, industrial projects, large municipal storm sewer systems, recycling facilities, electric power generating facilities, etc.). Because the NPDES permit process is an existing Federal program with its own implementation mechanism, no policy in the General Plan, and/or mitigation in this EIR, are required to ensure adherence. Policies within General Plan Section 8.20, however, specify coordination with the Regional Water Quality Control Board and the County, in response to EPA's NPDES stormwater permit regulations. Development of and adherence to the NPDES permit requirements will mitigate the projects potential impacts resulting from urban runoff quality.

Impacts From Irrigation & Release of Treated Waste Water

Two constituents of concern which typically percolate to the ground water as a result of irrigation of fertilized land, and through use of reclaimed water for irrigation, are Nitrogen (as nitrate) and Total Dissolved Solids (TDS).

The proposed project presents a potential risk to ground water quality due to fertilizer and pesticides which could percolate to ground water supplies through over watering and/or inappropriate pesticide application. These potential ground water impacts are considered mitigable if appropriate management practices are employed and supervised by trained professionals whose credentials are administered by the State and County agricultural officials. There are expected to be no significant impacts associated with irrigation using potable water supplies if the NPDES permit requirements are implemented.

The continued use of the waste water percolation ponds for ground water replenishment and the wide scale use of treated waste water for irrigation in the Planning Area will have a potentially significant but mitigable impact on ground water concentrations of nitrogen and TDS. Thus, wide scale use of treated waste water for irrigation and ground water replenishment through percolation ponds in the project area would likely increase ground water Nitrate and TDS concentrations, although estimates of actual increase must await data on both the extent of the proposed development of large turfed areas and of waste water treatment plants in the area. Note, however, that the Nitrate level of treated waste water is above State domestic water standards, and that borderline TDS content could be increased by irrigation using waste water, possibly to the point were State drinking water standards are exceeded. At the same time, use of treated waste water for irrigation and ground water replenishment could result in a reduction of well water consumed. Use of treated waste water for irrigation could cause a potentially significant but mitigable increase in Nitrate and TDS levels in the project area. This impact can be reduced below a level of significance when BMPs required by the NPDES permit are implemented.

---

[3] John M. Tettemer & Associates, Moreno Highlands Drainage Water Quality Management Plan, October 1991.

The use of reclaimed waste water for irrigation decreases the amount of nitrogen which will eventually enter the ground water basin. This is because nitrogen present in the reclaimed water acts as a substitute for nitrogen used as a separately applied fertilizer. Thus, the volumes of reclaimed water used for irrigation will have less of an impact on nitrogen levels in the ground water basin than the same amount of treated waste water if replenishment occurs through percolation ponds and recharge areas. Also, if treated waste water is used for irrigation, less fertilizer will be required than is standard practice when well water is used.

Buildout of the Planning Area may include the installation of septic tanks. Ground water contamination through the use of septic tanks could have a potentially significant but mitigable impact on ground water quality. This potential impact can be mitigated to a level of insignificance through adherence to State Water Quality Control Board standards and annual inspections to ensure that tanks are operating as designed.

As identified above, growth facilitated by the General Plan Update could potentially degrade water quality primarily by causing increases in the amount of urban runoff, percolation from irrigated areas and the release of treated waste water. The Water Quality Section of the Health and Safety Element and the Water Supply and Conservation Section of the Open Space and Conservation Element specify policies aimed at protecting and assuring water quality through the control of development and infrastructure, the control of the method of disposal of treated waste water, and the provision of water supplies which meet State water standards. The following section discusses these specific policies.

Coordination with local and regional water agencies to improve and enhance ground water quality in the region is provided for by Policy 8.20a. Through Policy 8.20b the City states its opposition of the development of projects that would rely on package waste water treatment plants. Policy 8.20c identifies the need to maintain the natural condition of water ways and flood plains to ensure adequate ground water recharge and water quality. The importance of ensuring adequate ground water recharge is also addressed in the Biotic Resources section through Policies 7.21e and 7.21l as well as in the Drainage and Flooding section through Policies 8.40c, 8.40d and 8.40f.

Ordinance No. 2145 requires waste water pretreatment on-site prior to discharging into the local sewer system. Policy 8.20k requires all industrial water users to comply with the industrial waste water pretreatment ordinance. Policy 8.20L identifies the importance of continued monitoring of landfills even after their closure to ensure future leaks into the aquifer are detected and contained as early as possible.

Regulation of development in areas converted from agricultural uses is affected by Policy 8.20m. Policy 8.20m requires that applicants wishing to develop in areas that are either existing, past orchard, or other agricultural uses, must take soil samples prior to grading or construction. The policy further states that if contamination is discovered the applicant is to consult with the appropriate agencies for proper clean-up measures to mitigate potential impacts to ground water resources.

Policy 8.20n calls for the construction of additional treatment plants or systems to treat contaminated ground water as necessary. This policy underscores the City's commitment to ensuring the availability of potable ground water.

In an effort to protect the integrity and quality of local surface waters from possible degradation due from siltation caused by wind or water erosion, Policy 8.20o requires that projects be designed in recognition of this potential. Policy 8.20 requires the preparation and implementation of a soil erosion plan, that would include soil erosion mitigation during construction. Policy 8.20p states that the City will coordinate with the Regional Water Quality Control Board to establish a system of well monitoring facilities.

### Additional Water Quality Mitigation and Unmitigable Impacts

With implementation of the General Plan policies discussed above, no significant unavoidable adverse impacts are anticipated with respect to water quality.

# 8.0 BIOTIC RESOURCES

Redlands General Plan / EIR

## 8.0 BIOTIC RESOURCES

**Setting.** The Redlands Planning Area is surrounded by remnants of past natural communities, and by some of the surviving species characteristic of these habitats. Most of these valued habitats are found along waterways and serve as wildlife corridors in addition to habitat for the species that grow or dwell within them. Valued habitats include areas within the Santa Ana River Wash, Mill Creek Wash, the Crafton Hills, San Timoteo Canyon, Live Oak Canyon, and the Badlands. The Zanja and associated drainages are candidates for potential riparian restoration that would increase habitat value. In addition, agricultural fields and the "urban forest" within developed areas provide habitat for some animals.

For a full discussion of existing conditions, consult MEA Section 7.0, Biotic Resources. This section includes information on the existing biological resources. In addition, this section also contains a list of environmental documents of other development projects which were used in documenting the biological resources for the Planning Area.

### Biotic Resources Impacts and Mitigation Provided by Plan Policy

Implementation of the General Plan is expected to reduce the amount of habitat available to wildlife, both due to the conversion of agricultural lands to urban uses, and as a result of construction in currently undeveloped areas. Implementation of the General Plan is anticipated to lead to no net loss of wetland acreage. As explained in EIR Section 4.0, Open Space, approximately 9,100 acres of open space (much of which functions as habitat) and a number of infill lots will be converted to urban uses over the next 15 years.

Although the conversion of agricultural lands to urban uses involves a substantial acreage, General Plan policies require the evaluation of the habitat value of agricultural fields and groves prior to their conversion to urban uses. Also, if a development has habitat to be converted to urban uses which is determined to be significant, policies require the consideration of incorporating open space uses of similar value (See policies 7.21t).

Although the overall impact of the General Plan implementation is expected to be a net loss of habitat, guiding and implementing policies specified in Section 7.21, Biotic Resources of the General Plan, stress minimizing disruption of the Planning Area's biotic resources, and focus on preservation of areas of valued habitat and protection of the Endangered Nevin's Barberry, Santa Ana River Woolystar and the Slender-horned Spineflower. Areas of valued habitat are contained within and adjacent to the San Bernardino National Forest, Santa Ana River Wash, Crafton Hills, San Timoteo/Live Oak canyons, the Badlands, along riparian corridors throughout the Planning Area, and within other open space areas.

Of all the biological resources within the Planning Area, three plants (Nevin's Barberry, Santa Ana River Woolystar, Slender-horned Spineflower), and two animals (Western Yellow Billed Cuckoo, Least Bell's Vireo) are listed as endangered by the State of California. A third animal, the Stephen's Kangaroo Rat, is listed as threatened by the State. As for the federal listing of plant species, only the Santa Ana River Woolystar and Slender-horned Spineflower are listed as federally endangered. Animal species including the Least Bell's Vireo and the Stephen's Kangaroo Rat are also federally listed as endangered. Due to their listing, impacts to these biological resources must be mitigated. Please refer to MEA Section 7.0, Biotic Resources, for a detailed list of all biological resources within the Planning Area and descriptions of each species.

As shown on GP Figure 7.2, Biotic Resources, most of the Planning Area's Rare, Threatened, Endangered or Special Status species are found in areas of valued habitat or where riparian restoration potential exists. General Plan policies specify coordination with appropriate agencies and jurisdictions to ensure preservation of valued habitat. Most of the areas of valued habitat shown on GP Figure 7.2 are designated on the Proposed General Plan Diagram as Flood Control/Construction Aggregates Conservation/ Habitat Preservation, Resource Conservation or Parks/Golf Courses. All areas containing biotic resources are subject to the policies in the General Plan (Section 7.0, Open Space and Conservation Element). These policies, which protect and preserve these resources, serve as mitigation to reduce or avoid impacts upon them, even if they are not shown on the General Plan Diagram

as open space. General Plan policies also protect the eight natural communities of special status identified by the Department of Fish and Game's California Natural Diversity Database (CNDDB) as present within the Planning Area and shown on GP Figure 7.2, Biotic Resources.

To ensure that areas of valued habitat that are not currently identified are afforded future protection, the General Plan specifies the preparation of a Master Biotic Management Plan, including an inventory of protected and common species, and species management plans, where relevant. Proposed project sites where species or their habitat (defined by the California Department of Fish & Game (CDFG) or the United States Fish & Wildlife Service (USF&WS) as sensitive or special status) might be present, require a project-specific biological assessment. Site-specific buffers must be designed for all projects found to be adjacent to, surrounding, or containing wetlands, riparian corridors, or wildlife corridors (See Policies 7.21h and 7.21i).

Although biotic resources will be impacted by the conversion of raw land to urban uses, actions will be taken to protect areas of valued habitat through the implementation of policies referenced in this section and stated in the General Plan.

While implementing policies will mitigate impacts to biotic resources, there are other issues which may affect these areas. These include the availability of surface water; the introduction of domestic animals into, and/or adjacent to, natural areas; and, the introduction of exotic plant species in landscaped areas. These are further discussed below.

Important biological resources within the planning area depend upon surface water for their existence. Any development that might significantly affect surface waters could potentially impact plant and animal life that depend upon this resource. As mentioned above, policies in the General Plan require a biological assessment of any proposed project site where species or habitat of the species might be present. Typically, as part of a biological assessment, blue line streams, as depicted on the United States Geological Survey Quadrangle Maps, are identified. These are an indicator of surface water bodies and riparian habitats. If blue line streams exist, then hydrophytic vegetation surveys are performed to assess and quantify the extent of riparian vegetation. If development impacts to riparian areas are determined, 404 permits from the U.S. Army Corps of Engineers and 1603 permits from the CDFG are required which may involve wetlands restoration on- or off-site. Consequently, biological assessments allow the preservation of riparian areas and surface waters for the continued existence of biological resources.

Due to urban development, the introduction of domestic animals into, and/or adjacent to, natural areas can impact biological resources. Because it is difficult to control the movement of pets, developments near habitat areas within the range of rare, threatened or endangered species will adversely impact localized fauna. This also has an affect on the movement of wildlife species through corridors. Mitigation measures which require buffers between structures and naturally occurring surface water or habitat areas can help mitigate these impacts. In addition, the construction of freeway and arterial street undercrossings can connect natural habitat areas to allow the movement of wildlife.

The General Plan intends to preserve the movement of wildlife species and exchange of genetic material between discrete habitat areas by implementation of wildlife corridor buffers and by construction of freeway and arterial street undercrossings, where necessary. Protection of riparian corridors also serves to preserve alignments where wildlife movement occurs. The General Plan states that developers, biologists and residents should work together to implement a plan which allows the movement of wildlife between discrete habitat areas (See Policies 7.21d, 7.21e, 7.21j and 7.21p ). This would also help reduce the potential of domestic animals intruding into wildlife corridors or habitats by limiting development in these areas.

The introduction of exotic plant species in landscaped areas has the potential to impact biological resources. Exotic plant species, especially those that are adapted to arid environments are often species which can establish themselves at the expense of natives and the animals that utilize native flora for food. Continued use of exotic plants can reduce the number of existing native plant species as well as animals in the area. To the extent that native plants provide habitat for animal species, use of exotic plants can cause a negative impact on biological resources.

The City currently has an Official Street Tree List which includes a number of species which are not indigenous to the area. To ensure that native plants are used within the Planning Area, the City has policies in the General Plan which would expand its street tree list to include native plants to the region, and require that landscaping in public areas be done with native vegetation (See Policies 7.21f and 7.21w). These policies are expected to contribute to the minimization of net impacts on native wildlife by providing additional urban habitat to compensate for the loss of native habitat.

In addition to important biological resources within the Santa Ana Wash, high quality construction aggregates have been mined within this water way since the 1920's. There is a potential for this type of activity to cause significant impacts on biological resources. The Surface Mining and Reclamation Act of 1975 requires all public agencies to map these mining resources (See MEA, Figure 8.2, Regionally Significant Construction Aggregate Resource Areas in the San Bernardino Production/Consumption Region). Also, public agencies are required to adopt policies recognizing the importance of mineral resources and any conflicts with other resources. Policy 7.21s, requires the coordination of aggregate resource extraction with habitat preservation and protection of biotic resources. As a condition of approval for mining operations, Policy 7.42b in the Open Space Chapter of the General Plan, requires the preparation and implementation of a reclamation plan to manage aggregate resources to ensure that extraction results in the fewest environmental impacts.

In GP Section 8.4, of the Health and Safety Element, flood control policies address efforts to restore and preserve sensitive biological resources (i.e., riparian corridors). Also, in GP Section 5.0, Circulation, policies provide for the designation of Class I bike ways along riparian corridors for recreation and aesthetic values which could benefit biological resources through restoration and preservation. Please refer to these sections for additional policies relating to the enhancement and preservation of biological resources.

As mentioned above, General Plan policies stress minimizing disruption of biotic resources, preservation of valued habitat areas, and protection of the Endangered and Threatened species of plants and animals. Implementation of the proposed land use designations for the Planning Area do not, in and of themselves, significantly conflict with existing sensitive biological resources, so long as surveys, impact assessments and mitigation measures are incorporated into project designs which will help reduce impacts to a level of insignificance.

### Additional Biotic Resources Mitigation and Unmitigable Impacts

The intent of the City of Redlands General Plan is to be self-mitigating. The policies and mitigation measures included in the General Plan mitigate potential impacts on biological resources within the Planning Area boundary. Based on the information presented above no additional biotic resources mitigations are necessary.

It should be noted, however, that despite the Plan's emphasis on conservation of biotic resources, the net loss of habitat expected to result from General Plan implementation contributes to the regional loss of habitat that has accompanied urbanization of the San Bernardino Valley. The cumulative impacts of habitat loss are thus considered significant. These cumulative impacts are unmitigable, unless all development is curtailed, which is not considered socially, politically, or economically acceptable or feasible.

# 9.0 MINERAL RESOURCES

Redlands General Plan / EIR

## 9.0 MINERAL RESOURCES

**Setting.** Portions of the Santa Ana River Wash, which includes Mill Creek, within the Redlands Planning Area contain deposits of sand and gravel construction aggregates used for making concrete and various other concrete products. The California Department of Conservation, Division of Mines and Geology (CDMG), estimates the quantity of construction aggregate resources in the San Bernardino Production-Consumption area at seven times the amount needed to supply the Region during the next 43 years. However, not all of these sand and gravel resources are available as reserves, and the CDMG predicts a short fall of construction aggregate in the Region in the next 35 years. State law requires cities to designate such Resource deposits on their General Plans and to avoid developing incompatible uses on or near them. Mining and processing aggregates creates noise, dust, and heavy traffic that is presently and potentially harmful to existing and proposed nearby residential areas. However, impacts from construction of surface developments overlying these reserves and/or resources or land-use restrictions that prohibit aggregate mining would constitute a loss of valuable mineral resources that cannot be mitigated. For a full discussion, consult MEA Section 8.0, Mineral Resources.

### 9.1 Mineral Resources Impacts and Mitigation Provided by Plan Policy

Redlands is required by State law to adopt policies recognizing the importance of construction aggregate resources and reserves and designating Regionally Significant Construction Aggregate Resource Areas to be conserved (See MEA Figure 8.1). Two types of impacts must be considered: adverse effects of urban development on future availability and transport of the resource and adverse effects on urban development of potential increased mining, processing, and transporting construction aggregates.

The City of Redlands has designated lands in the Santa Ana Wash as Construction Aggregates Conservation on the Land Use Diagram of the General Plan, which allows for mineral resource extraction and precludes urban development over the resource. In addition, the General Plan contains policies which respond to the State requirement to maintain adequate supplies of construction aggregates. These policies are designed to conserve sufficient amounts of aggregate resources to allow conversion of two 50-year supplies of reserves to meet the Planning Area's contribution to future regional needs. Again, the area of conversion lies within the Santa Ana Wash.

By preserving these areas for mineral resource extraction and not allowing land uses which introduce human inhabitants, impacts of urban development on future availability of the resource and, of potential increased mining, processing, and transporting of construction aggregates, will be reduced to levels of insignificance. The provision of sufficient aggregate resources to meet the local contribution to regional needs would comply with the State requirement and compensate for the loss of some MRZ-2 resources and provide for additional reserves as existing resources are depleted.

EIR Table 9.1 below shows the total number of acres designated as resource and reserve areas within the MRZ-2 Zone, the acreage which is being preserved, and those which are affected by urban land uses as designated on the proposed General Plan. As noted, all reserve areas and 87% of resource areas are being preserved.

By limiting Mineral Resource Zone (MRZ) areas to be conserved to those within the Santa Ana River Wash (Policy 7.42c), the General Plan prevents major land use conflicts that would result if all MRZ-2 areas were conserved, while retaining all existing aggregate reserves which are sufficient to supply the San Bernardino Production-Consumption Region for the next 35 years. Policies 7.42b and 7.42e provide for minimizing the impacts of aggregate extraction or processing through discretionary review of each application.

Table 9.1
Land Use Impacts on Significant
Construction Aggregate Resources Areas

| | Total Acres in Planning Area | Total Preserved | | Total Impacted by Urban Uses | |
|---|---|---|---|---|---|
| | | Acres | % | Acres | % |
| Sectorized MRZ-2 Zone* (Resources) | 5060 | 4400 | 87% | 660 | 13% |
| Reserve Area ** | 799 | 799 | 100% | 0 | 0% |

* Areas where CDMG has sufficient information on the quality, quantity, and marketability of mineral resources for designation as a regionally significant resource.
** Areas within the MRZ-2 Zone where mining is permitted (i.e., mining permit, zoning designation, etc.) by the lead agency having jurisdiction over such land.

As part of this analysis, General Plan policies 7.42a, d, and e have been added to state that additional areas within the Santa Ana River Wash designated as significant mineral resources (MRZ-2 Zone, Sector F) will be converted to reserves or zoned as Mineral Resources to meet Redlands' contribution to regional demands for the next 100 years (i.e., two 50-year increments). General Plan policies cited above and those listed below are anticipated to provide adequate mitigation to reduce impacts to mineral resources. The policies include the following:

7.42a "Conserve sufficient aggregate resources to allow conversion of two 50-year supplies (approximately 2400 acres) of aggregate reserves to meet the Planning Area's contribution to future regional needs.

7.42d "Clearly identify mineral resource areas, those areas targeted for conversion to reserves for possible future extraction, and areawide aggregate transportation routes. Policy 7.42c above indicates areas not suitable for future extraction.

7.42e "Apply zoning regulations to areas identified in Policy 7.42d allowing aggregate extraction as a conditional use and prohibiting incompatible land uses in Regionally Significant Construction Aggregate Resource Areas to be conserved. Zoning should cover sufficient area for two 50-year supplies of construction aggregate reserves and be reevaluated every 10 years per CDMG Guidelines.

It must be recognized that adequate mitigation for impacts on urban development may not be feasible for aggregate mining or processing at certain locations within the conserved area. In such cases, approval of aggregate mining or processing would be denied under Policy 7.42f. Policy 7.42f denies approval of surface mining permits at locations where unmitigated adverse impacts would be significantly greater than at alternative locations with the San Bernardino Production-Consumption Region, as shown in MEA Figure 8.1.

## 9.2 Additional Mineral Resources Mitigation and Unmitigable Impacts

Because the General Plan takes adequate steps to protect mineral resources and provides adequate local contribution to future regional needs, no additional mitigation measures are necessary. In addition, no unmitigable impacts are anticipated as a result of General Plan implementation.

# 10.0 CLIMATE, AIR QUALITY, AND WIND

Redlands General Plan / EIR

## 10.0 CLIMATE, AIR QUALITY, AND WIND

**Setting.** As with many cities favored with a Mediterranean climate and ringed with picturesque mountains, Redlands suffers poor air quality to the extent that the beauty of the City's setting is obscured by haze for a significant portion of the year. The problem is regional in scope, and the Redlands air quality planning effort is part of a larger effort to improve air quality in the South Coast Air Basin. The South Coast Air Basin (SCAG) is a 530 square mile area bounded by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto mountains to the north and east. According to the *Regional Air Quality Plan,* ozone and particulate matter were identified as the criteria pollutants whose improvement would yield the greatest air quality benefit in the San Bernardino County portion of the SCAB. The seasonal Santa Ana winds cleanse the air of "smog," but may widely distribute airborne particulate matter, and, when most severe, pose potential safety hazards. For a full discussion of existing conditions, consult MEA Section 9.0, Climate, Air Quality, and Wind.

### 10.1 Climate, Air Quality, and Wind Impacts and Mitigation Provided by Plan Policy

**Climate.** The Plan is not anticipated to affect the climate in any noticeable or quantifiable way.

**Air Quality.** Without implementation of the Air Quality Element policies in Section 8 of the Plan, achieving buildout and the addition of 35,343 residents and 81,144 jobs to the Planning Area would be expected to lead to continued violation of State and federal ambient air quality standards. However, the City's Air Quality Element (based on the Regional/San Bernardino County Model Air Quality Element) requires the achievement of economic growth in such a way that "good" air quality that is, air quality which meets State and federal standards can be achieved and maintained. The Air Quality Element recognizes that achieving and maintaining good air quality may require lifestyle and economic changes, to be implemented through market incentives where feasible, and through regulatory measures where necessary. Air quality is a regional problem that can only be addressed in a concerted way, through the combined efforts of all jurisdictions in the Air Basin; Plan policies support this coordinated effort.

The *Regional Air Quality Plan EIR* (prepared for San Bernardino County and cities), which bases its conclusions on Southern California Association of Governments (SCAG) projections, finds no significant adverse impacts resulting from implementation, and concludes that "The project [*Regional Air Quality Plan*] will result in significant benefits to air quality and human health."[1]

The *1994 Air Quality Management Plan* (AQMP) was based upon the population forecast developed by SCAG for each county within the SCAB. That forecast included population estimates for San Bernardino County for 1990 (1,107,587) for 2000 (1,425,277) and for year 2010 conditions (1,730,685).[2] Based upon those projections, population growth within the County is expected to occur at an average annual rate of 2.26 percent, between 1990 and 2010. That annual population growth rate between 2000 and 2010 is somewhat lower (1.96 percent).

By comparison, the Redlands Planning Area had a 1990 population of 60,394 that grew to 66,301 by 1994. The proposed General Plan would, upon buildout, accommodate a population of 101,644. This represents an average annual population growth rate within the Redlands Planning Area of 2.10 percent between 1990 and General Plan buildout. Between 1994 and General Plan buildout, the average annual population growth rate would be 2.06 percent (assuming buildout by the year 2015).

---

[1] *Regional Air Quality Plan EIR,* February 1991, Section 1.3, p.3.

[2] SCAQMD, "Draft 1994 Air Quality Management Plan", April 1994, Appendix III-A, Table 3-6, p.III-8.

Consequently, the population growth accommodated by the proposed General Plan appears to be consistent with that assumed in the 1994 AQMP. The 1994 AQMP demonstrates attainment of the federal and state ambient air quality standards but calls upon local governments to play an active role in reducing mobile source emissions through the implementation of specific actions. By incorporating as many AQMP control measures as feasible in the Redlands General Plan and Municipal Code (e.g., Chapter 18.224 Transportation Control Measures) and updating the General Plan to achieve consistency with SCAG population and employment projections, the City of Redlands has demonstrated its commitment to improving air quality by reducing emissions from mobile sources through its community planning and development process.

Based on the *Regional Air Quality Plan EIR's* findings that implementation of the *Regional Air Quality Plan* will lead to significant benefits for a San Bernardino County population growing much more rapidly than the Redlands Planning Area population, the Draft General Plan EIR concludes that implementation of the Redlands General Plan, which substantially incorporates the Regional/San Bernardino County Model Air Quality Element recommended for local use by the *Regional Air Quality Plan*, would have no significant adverse impact.

The following discussion of short-term construction and long-term operational impacts is an excerpt from Redlands General Plan Update Air Quality Technical Background Study prepared by Endo Engineering in August, 1995. The entire study is included in Appendix C, and should be consulted to fully understand the air quality aspect associated with the Planning Area.

**Short-Term Construction-Related Impacts**

Short-term impacts on air quality will occur during the construction activities required to implement the land uses in the proposed General Plan. These adverse impacts will include:

1) air pollutant emissions at the power plant serving the site while temporary power lines are needed to operate construction equipment and provide lighting;

2) exhaust emissions from the construction equipment used on-site as well as the vehicles used to transport the off-highway construction equipment required to and from the site;

3) exhaust emissions from the passenger vehicles of the construction workers;

4) particulate emissions (fugitive dust) from excavation, grading and clearing activities on-site;

5) exhaust emissions from the heavy trucks used to haul soil to or from the site if the earthwork on-site is not balanced;

6) exhaust emissions from the heavy vehicles used to transport building materials to the site;

7) emissions related to the development of any recreational areas and landscaping; and

8) emissions from architectural coating and paving materials used on-site for buildings, roads, parking lots etc.

At the General Plan level of analysis, precise quantification of construction level emissions is not possible, since the City of Redlands has no direct control over the housing market, local financing or developer schedules. However, air quality impacts resulting from construction activities could be significant, as shown below. Consequently, mitigation measures are required to reduce these impacts. Potential mitigation measures for use as conditions of approval on a project-by-project basis are provided in Appendix C. All applicable mitigation measures should be appropriately incorporated to reduce construction-related air quality impacts to the maximum extent feasible.

### Construction Period Exhaust Emissions

Localized exhaust emissions will result from the use of construction equipment as the proposed General Plan is implemented. Exhaust emissions over a broader area will result from the transport of off-highway equipment and the construction crews to and from various construction sites within the Redlands Planning Area.

Diesel construction equipment constitutes approximately 90 percent of the heavy construction machinery in use today. It emits, on the average, almost two pounds of NOx (and smaller amounts of CO and VOC) for each hour of usage (EPA, AP-42). Construction equipment emission rates on very active days may total several hundred pounds of contaminants per hour.

The South Coast Air Quality Management District (SCAQMD) has derived a generalized factor (250,000 brake horsepower hours of energy to develop one acre of vacant land) for use in estimating construction equipment emissions for General Plan analyses. Although the total emissions from construction equipment that would result from developing the 10,486 vacant acres involved in the proposed General Plan Update are finite, the daily emission rate would vary with the time interval over which the construction activities occurred and the level of construction activity at any given time.

The construction period emissions that would be generated to develop 10,486 vacant acres are shown in Table 10.1 in terms of pounds or tons emitted over the entire construction period (rather than pounds per day). Consequently, it is difficult to compare them to the SCAQMD significance thresholds, which are given in term of emissions per day or per quarter in Table 10.2. To facilitate this comparison and thereby identify the potential significance of the short-term impacts, assumptions were made regarding the construction interval required to implement the proposed General Plan.

For a "worst case" short-term impact assessment, it was assumed that 10,486 acres of vacant land could be developed within 20 years. Given that 260 working days per year are typically available to construction crews, 2.0 acres would need to be developed per day to complete 10,486 acres of development in 20 years. Table 10.1 provides the construction equipment emissions by pollutant, assuming 2.0 acres are developed per day within the Planning Area. It also shows the daily emissions if only one acre were developed per day in the Planning Area and General Plan buildout were to require 40 years to complete.

It can be seen from Table 10.1 and Table 10.2 that development at a rate of one acre per day within the Planning Area would result in exceedances of the SCAQMD threshold criteria for all pollutants. In fact, if the City of Redlands were to opt solely to reduce the rate of development in an attempt to avoid exceedances of the SCAQMD thresholds, it would have to restrict the rate of development within the study area to a maximum of 0.016 acres per day. At that development rate, the General Plan would not be implemented until more than 2,500 years had elapsed. Clearly, other measures are required to minimize short-term emissions. Any development would generate a significant short-term impact and it is virtually impossible to mitigate short-term construction impacts to a level of insignificance.

**Table 10.1**
**Construction Period Equipment Exhaust Emissions[a]**

| Scenario/Pollutant | Construction Equipment Exhaust Emissions (Pounds) | (Tons) |
|---|---|---|
| **Emissions Generated To Develop 10,486 Acres** | | |
| CO | 26,561,454 | 13,281 |
| VOC | 5,831,971 | 2,916 |
| NOx | 63,574,262 | 31,787 |
| SOx | 5,381,581 | 2,691 |
| $PM_{10}$ | 5,208,355 | 2,604 |
| **Daily Emissions Generated To Develop 2.0 Acres Per Day[b]** | | |
| CO | 5,066 | 2.53 |
| VOC | 1,112 | 0.56 |
| NOx | 12,126 | 6.06 |
| SOx | 1,026 | 0.51 |
| $PM_{10}$ | 993 | 0.50 |
| **Daily Emissions Generated To Develop One Acre Per Day[b]** | | |
| CO | 2,533 | 1.27 |
| VOC | 556 | 0.28 |
| NOx | 6,063 | 3.03 |
| SOx | 513 | 0.26 |
| $PM_{10}$ | 497 | 0.25 |

a. See the construction period equipment emissions worksheet in the Appendix for emission factors, assumptions and calculations.

b. The rate of development is a variable that is controlled by the economic climate and cannot be estimated with any degree of accuracy at the General Plan level of analysis. A development rate of one acre per day, for example, implies that a 1,000 acre site could be fully developed within 1,000 days and the General Plan could be implemented over the next 40 years. A development rate of 2.0 acres/day would imply buildout over a 20-year period (with construction activities assumed to occur on 260 days/year).

**Table 10.2**
**SCAQMD Significance Threshold Criteria[a]**
**(Pounds/Day)**

| Pollutant | CO | VOC | NOx | SOx | $PM_{10}$ |
|---|---|---|---|---|---|
| **Daily Operations Emissions Thresholds** | | | | | |
| - Pounds/Day | 550 | 75 | 100 | 150 | 150 |
| **Quarterly Construction Emissions Thresholds** | | | | | |
| - Pounds/Day | 550 | 75 | 100 | 150 | 150 |
| - Tons/Quarter | 24.75 | 2.5 | 2.5 | 6.75 | 6.75 |

a. SCAQMD, *CEQA Air Quality Handbook;* November, 1993.

The SCAQMD recommends a series of mitigation measures that can assist in reducing construction emissions (see Section 4.0 of the Technical Report in Appendix C). These measures rely on the use of diesel rather than gasoline-powered equipment, keeping the construction equipment well-tuned and employing activity management techniques (rescheduling for use in off-peak hours or using fewer pieces of equipment for a longer period of time).

**Graded Surface $PM_{10}$ Emissions**

Sources of construction activity $PM_{10}$ typically include: grading, demolition (when applicable), heavy-duty equipment on paved and unpaved roads and the loading and unloading of trucks when cut and fill quantities are not balanced on a particular site. An average $PM_{10}$ emission factor for construction activities is 26.4 pounds of $PM_{10}$ per day per acre disturbed.[3] This factor can be reduced by half through regular watering.

Since the number of disturbed acres can not be accurately estimated at the General Plan level of analysis, an effort has been made to determine the number of acres that can be graded or disturbed without exceeding the SCAQMD significance threshold of 150 pounds of $PM_{10}$ per day. It was determined that with adequate water control, 11 acres could be disturbed daily without exceeding the threshold. Water control is a standard requirement of the City of Redlands. Refer to the Appendix for assumptions and calculations.

Based on the SCAQMD graded surface factor of 26.4 pounds of $PM_{10}$ per day per acre, with 1 to 2 acres of the Planning Area in a disturbed state on 65 working days per quarter) construction, of a future project would generate 26.4 to 52.8 pounds of $PM_{10}$ per day or 0.9 to 1.7 tons of $PM_{10}$ per quarter.[4] Therefore, surface grading $PM_{10}$ emissions will not exceed the SCAQMD significance threshold of 6.75 tons per quarter.

Future project proponents will comply with SCAQMD Rule 403 (see the Appendix to the Technical Report) which prohibits the release of fugitive dust emissions from any active operation, open storage pile, or disturbed surface area beyond the property line of the emission source. Particulate matter deposits on public roadways are also prohibited. Future project proponents will be required to comply with all reasonably available control measures, as part of the development review process.

**Paving Material and Architectural Coating Emissions**

Volatile organic compound (VOC) emissions will occur as a result of surface coating and paving materials used during future construction processes. SCAQMD Rule 1108[5] prohibits the use of rapid and medium cure cutback asphalts in the SCAB (asphalt can contain no more than 0.5% by volume organic compounds). Further, Rule 1108.1 prohibits any organic compounds in emulsified asphalts. Therefore, it is expected that VOC emissions, as a result of paving activities, will be minor.

The volatile organic compound content of architectural coating materials (paint, varnish, lacquer, primer, etc.) will not be permitted to exceed the SCAQMD's Rule 1113 architectural coating threshold of 2.08 pounds of VOC per gallon. Most, if not all, of the VOCs will evaporate during the surface coating application and drying process. To minimize VOC emissions during future surface coating operations, the use of water-based enamels will be encouraged to the extent feasible and the use of lacquers shall be discouraged.

---

[3] SCAQMD, *CEQA Air Quality Handbook; 11/93; Table A9-9; pg A9-93.*

[4] SCAQMD, *CEQA Air Quality Handbook*, April 1993, Table 9-9.

[5] Telephone communication with Ms. Linda Basilio, SCAQMD, on 4/30/93.

### Long-Term Operational Impacts

### Air Pollutant Emission Projections

Emission projections can be made for the proposed General Plan buildout year by multiplying anticipated motor vehicle, natural gas, and electrical usage rates by the appropriate emission factors (EMFAC7EP). The results obtained in this manner are detailed in the Appendix and summarized in Table 10.3, which provides the future daily buildout air pollutant emissions associated with the proposed General Plan.

**Table 10.3**
**Proposed General Plan Buildout Air Pollutant Emissions[a]**

| Primary Pollutant | Natural Gas (Lbs./Day) | Electricity (Lbs./Day) | Vehicular (Lbs./Day) | Total (Lbs./Day) |
|---|---|---|---|---|
| CO | 16.24 | 142.08 | 96,852.64 | 97,011 |
| VOC | 4.30 | 7.10 | 18,885.68 | 18,897 |
| NOx | 500.91 | 816.96 | 14,465.42 | 15,783 |
| SOx | Negl. | 85.25 | 1,153.21 | 1,238 |
| $PM_{10}$ | 0.16 | 28.42 | 2,521.71 | 2,550 |

a. See the Appendix for assumptions and calculations. Year 2009 EMFAC7EP emission factors were assumed.

The proposed General Plan would generate 97,011 pounds of carbon monoxide, 18,897 pounds of volatile organic compounds, 15,783 pounds of Nitric Oxide NOx, 1,238 pounds of Sulfur Oxide SOx and 2,550 pounds of particulates daily, once completed. These emissions projections include hot start, cold start, hot soak, and diurnal emissions. Of the total project-related emissions, approximately 1.2% would be emitted by stationary sources and 98.8% would be emitted over a broad area by motor vehicles.

### Significance of Long-Term Emissions

As shown in Table 10.4, buildout of the proposed General Plan would exceed the SCAQMD threshold criteria for all pollutants on a long-term basis. Since long-term project-related emissions would be considered a significant adverse impact by the SCAQMD, mitigation strategies designed to improve the area jobs/housing balance and reduce VMT should be incorporated in future projects to the maximum extent feasible to reduce adverse long-term effects on air quality.

### Toxic and Hazardous Emissions

Although the number and nature of future additional air pollutant point sources is presently unknown, each individual source will be required to comply with SCAQMD Rules and Regulations. Air pollution regulations at the state and federal level have historically focused on the criteria pollutants (NOx, SOx, CO, lead, particulates, and ozone). However, in the past decade, there has been growing concern regarding the potential impacts of other harmful pollutants emitted to the air. These are generally referred to as toxic air contaminants or "air toxics". As of April 1991, fourteen toxic air contaminants have been identified as cancer-causing.

**Table 10.4**
**Significance Of Long-Term Impacts**

| Primary Pollutant | Proposed General Plan Buildout Emissions (Lbs./Day) | SCAQMD Threshold[a] (Lbs./Day) |
|---|---|---|
| CO | 97,011 | 550 |
| VOC | 18,897 | 75 |
| NOx | 15,783 | 100 |
| SOx | 1,238 | 150 |
| $PM_{10}$ | 2,550 | 150 |

a. SCAQMD, *CEQA Air Quality Handbook;* November, 1993.

The SCAQMD has developed a number of rules and regulations directed at "air toxics" and criteria pollutants with the objective of setting forth pre-construction review requirements for new, modified or relocated facilities. These regulations require that sources of hazardous materials or criteria pollutants above threshold levels obtain permits prior to operation of the facility. Overall, the specific air quality goal is to achieve annual emission reductions that are at least five percent greater than the total annual emission increases from the new or modified equipment.

**Air Quality Projections**

An assessment of the project-related impact on localized ambient air quality requires that future ambient air quality levels be projected. Carbon monoxide concentrations were estimated adjacent to nearby intersections carrying appreciable volumes of project-related traffic using the California Department of Transportation Line Source Dispersion Model (CALINE 4).

Carbon monoxide levels in the project vicinity during peak hour traffic were assessed with the CALINE 4 computer model at the intersections most affected by project-related traffic. To simulate "worst case" meteorological conditions, a wind speed of 0.5 meter per second (1 mph) and Stability Class G were assumed for 1-hour averaging periods. A "worst case" wind direction of ten degrees from parallel on the highest volume roadway link was assumed since near parallel winds result in the highest carbon monoxide concentrations at receptors adjacent to the roadway. A comparison of the projected carbon monoxide levels to state and federal standards indicates the significance of the projected concentrations.

Since eight-hour traffic projections were unavailable, eight-hour carbon monoxide levels could not be projected directly with the CALINE 4 model. However, Caltrans has developed a recommended methodology for projecting 8-hour concentrations from the 1-hour CALINE 4 forecasts. The methodology multiplies the concentrations generated by local roadways (total concentrations less background) by a persistence factor. This quantity is then added to a suitable 8-hour background concentration. It has been determined that the appropriate persistence factor is 0.86 for the Redlands Planning Area.

The scenario analyzed reflects buildout traffic volumes for the proposed General Plan in the City of Redlands. As shown in Table 10.5, carbon monoxide concentrations adjacent to the five intersections analyzed will be below the 20 parts per million (ppm) state standard and 35 ppm federal standard (1-hour average) with buildout of the proposed General Plan. Similarly, the state and federal 8-hour carbon monoxide standards will not be exceeded in the Redlands Planning Area if the future background CO concentrations remain at the levels projected in the SCAQMD *CEQA Air Quality Handbook*.

Table 10.5
Proposed General Plan
Buildout Carbon Monoxide Concentrations[a]

| Receptor Distances[b] (Feet) | 1-Hour Average (ppm) 50 | 100 | 200 | 8-Hour Average (ppm) 50 | 100 | 200 |
|---|---|---|---|---|---|---|
| **Alabama Street @** | | | | | | |
| - Redlands Blvd. | 1.3 | 0.9 | 0.5 | 1.1 | 0.8 | 0.4 |
| - Lugonia Avenue | 1.4 | 0.8 | 0.5 | 1.2 | 0.7 | 0.4 |
| **Orange Street @** | | | | | | |
| - Redlands Blvd. | 1.4 | 0.5 | 0.3 | 1.2 | 0.4 | 0.3 |
| - Lugonia Avenue | 0.9 | 0.5 | 0.3 | 0.8 | 0.4 | 0.3 |
| **Citrus Avenue @** | | | | | | |
| - Judson/Ford Street | 0.5 | 0.3 | 0.2 | 0.4 | 0.3 | 0.2 |
| Background CO Concentration[c] | 5.3 | 5.3 | 5.3 | 3.9 | 3.9 | 3.9 |
| State Standard | 20.0 | 20.0 | 20.0 | ≥9.1 | ≥9.1 | ≥9.1 |
| Federal Standard | 35.0 | 35.0 | 35.0 | ≥9.5 | ≥9.5 | ≥9.5 |

a. Year 2009 emission factors were assumed, since none are currently available for the buildout year.
b. Receptor distances are measured from the roadway centerline.
c. Source: SCAQMD, *CEQA Air Quality Handbook;* 11/93; Tables 5-2 and 5-3, pg. 5-15 and 5-16.

Over a 1-hour averaging period, "worst-case" traffic associated with buildout of the proposed General Plan would contribute up to 1.4 ppm to the carbon monoxide concentration at 50 feet from the roadway centerlines at two intersections as shown above. The highest carbon monoxide level expected will occur at 50 feet from the intersection of Redlands Boulevard at Orange Street. It will reach 6.7 ppm over a 1-hour averaging period and 5.1 ppm over an 8-hour averaging period.

A project has a significant impact if it interferes with the attainment of the state 1-hour or 8-hour carbon monoxide standards by either exceeding them or contributing to an existing or projected violation. The proposed project will not cause state CO standard exceedances in the vicinity or contribute to an existing or projected violation.

**Wind.** Implementation of the Plan is not anticipated to increase wind hazards within the Planning Area. Since data on high wind areas within the Planning Area is not available, Plan policies specify the identification of such areas as data becomes available, and the protection of people and property from the adverse impacts of high winds.

## 10.2 Additional Climate, Air Quality, and Wind Mitigation and Unmitigable Impacts

Plan policies cited above are anticipated to provide adequate mitigation, and no further measures are necessary. There are anticipated to be no unmitigable significant adverse impacts related to climate, air quality, and wind as a result of implementation of the General Plan.

# 11.0 HISTORIC, ARCHAEOLOGIC, AND PALEONTOLOGIC RESOURCES

Redlands General Plan / EIR

## 11.0 HISTORIC, ARCHAEOLOGIC, AND PALEONTOLOGIC RESOURCES

**Setting.** Redlands contains significant historic, archaeologic, and paleontologic resources. The City is noted for its Victorian and Craftsman homes and historic neighborhoods. The City initiated an inventory of historic structures in 1976 after receiving a State grant to survey historic properties. This study documented 568 historic properties. As a result the City formed the Historic and Scenic Preservation Commission in order to advise the City Council regarding designation and protection of historic resources. As recommended by the Commission, over 60 structures and 8 districts on its Register of Historic and Scenic Properties and several streets have been designated Scenic Drives.

Despite the fact that perhaps less than 10 percent of the urban area and 25 percent of the rural portions of the Planning Area have been surveyed for archaeological finds, locations of artifacts and remnants of the lives of the native Serrano and Gabrielino peoples have been identified, and landscape features reflecting Spanish presence are evident. The highest potential for finding evidence of these people is in the vicinity of creeks and streams such as San Timoteo Canyon Creek, Yucaipa Creek in Live Oak Canyon, the Hillsides above the Santa Ana River, Mill Creek and the tributaries of these water sources.

Paleontologic resources are the fossil remains or traces of past life forms including plants and both vertebrate and invertebrate animal species. Sediments containing valuable paleontologic resources are found in San Timoteo Canyon. For a full discussion of existing conditions, consult MEA Section 10.0, Historic, Archaeologic, and Paleontologic Resources.

### 11.1 Historic Resources Impacts and Mitigation Provided by Plan Policy

Approval of the Draft General Plan will encourage development within the Planning Area throughout the life of the Plan which could potentially have an adverse impact on historic resources. The Plan, however, is designed to minimize impacts on historic resources. The Land Use Element does not propose intensification of use in historic areas. Instead, it eliminates or reduces increased intensity envisioned by the 1972 General Plan and existing zoning. Examples are the residential areas bounded by Olive, Fern, Cajon, and Center streets and by Colton Avenue, Texas Street, Lugonia Avenue, and Orange Street. High traffic volumes on arterials and the widening of these streets to four lanes could have potential adverse impacts on North Redlands historic resources. Despite broad support for preservation, some loss of historic resources in these and other areas would be likely because restoration of older buildings typically is more costly than minimum maintenance or replacement.

The Draft General Plan contains policies in Section 3.20, Historic and Scenic Preservation, which serve to identify, maintain, protect, and enhance the City's cultural, historic and architectural resources. The Guiding Policies in Section 3.20 of the General Plan provide general strategies to encourage retention of the City's historic neighborhoods and structures or reconversion to their original use when feasible. The Implementing Policies in GP Section 3.21, Historic and Scenic Conservation Areas, provide specific actions to be taken in order to preserve historic resources. These actions include designating Historic and Urban Conservation Districts; establishing zoning regulations that implement Historic Preservation Policies; and establishing guidelines for adaptive re-use of historic structures.

### Additional Historic Resources Mitigation and Unmitigable Impacts

Plan policies cited above are anticipated to provide adequate mitigation, and no further measures are necessary. There are anticipated to be no unmitigable significant adverse impacts related to historic resources as a result of implementation of the General Plan.

## 11.2 Archaeologic and Paleontologic Resources

### Archaeologic and Paleontologic Resources Impacts and Mitigation Provided by Plan Policy

Buildout of the proposed General Plan will result in additional population, housing and other development along with associated circulation improvements. This has the potential to result in the loss of significant archaeological resources if proper procedures are not implemented since the Plan proposes development in areas which have not been surveyed in detail for the presence of archaeologic and paleontologic resources. Policies in Section 7.30, Preservation of Archaeologic and Paleontologic Resources, however, are designed to protect both known resource areas and those archaeologic artifacts and paleontologic resources discovered incidentally in the course of construction. The Guiding Policy for preservation of archaeological and paleontological resources is to "Protect archaeologic and paleontologic resources for their aesthetic, scientific, educational and cultural values."

The City worked closely with the California Archaeological Information Center (AIC) at the San Bernardino County Museum to prepare an Archaeological Resource Sensitivity Map to be used in preliminary project review. (See MEA Figure 10.1, Archaeological Resource Sensitivity Map.) Implementing Policies require that this map be consulted for all development sites to determine whether there are known or potential resources within the project area. For projects identified by the AIC as potentially affecting sensitive resource sites, sponsors must hire a consulting archaeologist to develop an archaeologic resource mitigation plan, and policies in GP Section 7.30 specify that the City will monitor the project to ensure that mitigation measures are implemented.

Although accidental destruction of resources could occur even with these policies in place, the level of protection afforded archaeologic and paleontologic resources by full implementation of the Plan are anticipated to result in a net benefit for these resources.

### Additional Archaeologic and Paleontologic Resources Mitigation and Unmitigable Impacts

Plan policies cited above are anticipated to provide adequate mitigation, and no further measures are necessary. There are anticipated to be no unmitigable significant adverse impacts related to archaeologic and paleontologic resources as a result of implementation of the General Plan.

# 12.0 VISUAL QUALITY

Redlands General Plan / EIR

# 12.0 VISUAL QUALITY

## 12.1 Environmental Setting

The City of Redlands is situated in the East Valley region of San Bernardino County. The valley is rimmed on the west by the Chino, Puente, and San Jose Hills, and on the northwest by the San Gabriel Mountains. The range of mountains bordering the largest part of the Planning Area is the San Bernardinos. The eastern edge of the valley is also bordered by the Yucaipa and Crafton Hills. Alluvial highlands extend south from the San Bernardino Mountains and end at the southern limits of the valley in canyon foothills, lowlands and the San Timoteo and Live Oak Canyons.

The East Valley subregion is currently experiencing tremendous growth, transitioning from citrus-oriented agriculture to urban development.

## 12.2 Visual Elements

The City of Redlands has several visual elements which make it a unique community.

Some of these distinctive landscape features or visual elements include:

- Citrus groves which nearly surround the City.
- Chaparral covered foothills and canyons.
- Views of the San Bernardino Mountains from the bluffs above the Santa Ana River Wash.
- Diverse freeway views of the mountains, tall palm rows and citrus groves.
- The gradual southward rise of the valley floor from downtown to the San Timoteo Canyon hills.
- The traditional downtown.
- Downtown diagonal street pattern contrasted to the surrounding north-south oriented grid.
- Renowned high quality architecture and historic resources.
- Traditional town character outside the 19th Century town.
- University of Redlands and citrus groves of the north Redlands sector.
- Village-like character of the Mentone subdivision.

For an expanded discussion of these elements, see MEA Section 11.0, Visual Quality.

## 12.3 Visual Quality Impacts and Mitigation Provided by Plan Policy

The primary impact of implementation of the General Plan will be a probable increase in urban growth. The potential growth may reduce perception of Redlands as a free standing City dominated by agriculture and natural open space. The alteration of viewshed character from open space or agriculture to developed landsites is a significant adverse impact. In response to this impact, the Plan has both guiding and implementing policies for City design and historic and scenic preservation found in GP Section 3.20, Historic and Scenic Preservation.

The policies within Section 3.0 of the General Plan, the City Design and Historic Preservation Element, are intended to both enhance the visual quality of the City and mitigate adverse impacts of urban growth as mentioned above.

Guiding Policy 3.10a of City Design encourages awareness of Redlands' citrus industry heritage by preserving agriculture. Policies 3.10b and 3.10c and Implementing Policy 3.10o require the City to retain the unique character of Redlands' neighborhoods, streets, and buildings and to discourage large master planned projects. Policy 3.10d encourages creation of new focal points. City Design Guiding Policy 3.10e requires the preservation of the natural appearance of steep hillsides and ridges for both visual satisfaction and conservation, as well as, for safety and fiscal reasons. Guiding Policy 3.10f requires the establishment of City entrances. Guiding Policy 3.10g and Implementing Policies 3.10l, 3.10m, 3.10n encourage the preparation and

implementation of a landscape Master Plan along the I-10 corridor and a City-wide streetscape plan for arterial street plantings. To maintain the character of downtown Redlands, Guiding Policy 3.10h has been created. Guiding Policy 3.10i and Implementing Policies 3.10p, 3.10q and 3.10u require the City to strengthen the image of north Redlands by utilizing visual diversity, planting large scale trees on arterial streets, and encouraging the completion of the Santa Ana River Wash blufftop scenic drive. Guiding Policy 3.10j requires the City to protect the rural character of the San Timoteo and Live Oak Canyons. Guiding Policy 3.10k and Implementing Policies 3.10r and 3.10t encourage development of street setbacks, landscaped medians and scenic overlooks to enhance the City's circulation systems' aesthetics.

The General Plan Guiding Policies for Historic and Scenic Preservation endeavor to retain the traditional town character by preserving historic architectural resources and minimizing intrusion of commercial development along residential arterial streets. General Plan Sections 3.21, 3.22, 3.23 and 3.24 contain comprehensive implementing policies for historic and scenic conservation areas, City property, privately-owned historic resources, and proposed development. GP Sections 3.25 and 3.28 of the Plan encourage citizen participation, education and cooperation with preservation groups and advisory bodies. GP Section 3.26, 3.27, 3.29 and 3.30 detail Implementing Policies for government decision-making, commercial and redevelopment areas, agricultural and scenic area, and preservation of older neighborhoods.

## 12.4 Additional Visual Quality Mitigation and Unmitigable Impact

General Plan policies in the City Design and Historic Preservation Element, the Land Use Element, and the Open Space and Conservation Element provide adequate mitigation. There are anticipated to be no significant adverse visual impacts as a result of implementation of the General Plan.

## 12.5 Light and Glare

### Environmental Setting

The City of Redlands is characterized by its historic architectural resources and agricultural heritage. Light and glare is generally not a problem due to the absence of large industrial developments, extensive street lighting, and large glass/mirrored building facades. Night lighting levels are relatively low, allowing excellent views of the valley.

Sources of artificial light are many and can vary from low level street lighting to high intensity uses such as that of a stadium. The higher intensity lights tend to produce more potential problems. Increases in lighting conditions within a viewshed may vary with the distance of the viewer from the light source. An increase in lighting to a distant viewer may result in the addition of illumination at the location of that viewer, or it may only appear to be increased light in the night landscape. Glaring conditions may result from reflective surfaces on new developments or from lighting that is excessively bright, to the point of being uncomfortable and visually disturbing.

### Light and Glare Impacts and Mitigation

One of the impacts of implementation of the proposed General Plan will be a greater intensity and density of development in the Planning Area. Development allowed under the proposed Land Use Plan will create new sources of light and glare. Artificial lighting will accompany all new development. This includes exterior and interior lighting for buildings, signage, walkways, landscaped areas, parking lots and street lighting. Potential development of vacant lots and hillside areas will increase the nighttime lighting levels in the Planning Area. Glare from reflective surfaces will occur with developments that use mirrors, bright lights, and other reflective surfaces for building facades.

New lighting also may adversely affect existing neighboring residential development, unless lighting is directed downward, away from residences, and adheres to specific regulations as to the type and intensity of

lighting and of light shielding.

Light and glare impacts are often site specific and the City Design and Preservation Element of the General Plan addresses general design issues and establishes guidelines to mitigate light and glare impacts from new development. Guiding Policies 3.10b and 3.20a encourage the protection, enhancement and maintenance of Redlands' unique city character including structures, streets, and streetlighting. Implementing Policies 3.22b, and 3.23c encourage maintenance and improvement of Redlands' existing streets, structures and streetlighting. Implementing Policies 3.22c, 3.24a, 3.24b, 3.24c and 3.24d encourage design guidelines, quality construction and site compatibility for proposed development.

**Additional Light and Glare Impacts, Mitigation and Unmitigable Impacts**

No unmitigable significant adverse impacts related to light and glare are anticipated as a result of General Plan implementation.

# 13.0 TRAFFIC

Redlands General Plan / EIR

## 13.0 TRAFFIC AND TRANSPORTATION

**Setting.** Appendix A contains the Traffic Study Technical Report, prepared by DKS Associates, and should be consulted for a full understanding of the Planning Area traffic and transportation setting.

### 13.1 Traffic and Transportation Impacts and Mitigation Provided by Plan Policies

If travel habits were to remain unchanged from 1994 to buildout of the Draft General Plan, significant adverse traffic impacts would result despite implementation of improvements specified in the Circulation Element. Traffic level of service would be E or F on 11 arterial street segments and on segments of the I-10 and Route 30 freeways.

General Plan policies provide various types of mitigation, including striving to maintain LOS C or better (Policies 5.20a, b, c), designing roadways and development proposals based on LOS standards (Policy 5.20d), monitoring traffic levels of service (Policies 5.20e, f), identifying, scheduling and implementing roadway improvements (Policy 5.30a), reviewing the Circulation Network with neighboring jurisdictions (Policy 5.30b), reviewing and coordinating freeway and highway requirements with Caltrans (Policy 5.30c), adopting design standards for each functional roadway classification (Policy 5.30d), levying fees on new developments for roadway improvements (Policy 5.30e), exploring adequate financing mechanisms for roadway improvements (Policy 5.30f), providing adequate capacities on arterials to meet LOS standards (Policy 5.31a), locating high traffic generating uses to have direct access to arterials (Policy 5.31.b), establishing a funding system to complete arterial roadway improvements (Policy 5.31c), controlling the number of intersections and driveways to maximize carrying capacities (Policy 5.31d), keeping certain roadway classifications below specified average daily trip volumes (Policies 5.32a, b), discouraging through traffic on local streets (Policy 5.32c), encouraging special design standards for local streets (Policy 5.32d), avoiding additional traffic to streets carrying volumes above the LOS standards (Policy 5.32e), designing short, discontinuous streets to discourage through traffic (Policy 5.32f), providing a network of collectors in the northeast and northwest areas of the City (Policy 5.32g), adopting design standards for hillside and rural areas (Policy 5.32h), working with Caltrans to achieve funding and timely construction of freeway and interchange improvements (Policies 5.33a, b, c, d, e), support the Congestion Management Program of the County and ensure that TDM programs including reduced peak period trip generations and the use of alternate modes of transportation are being implemented (Policies 5.40a-k), encourage, designate and establish a comprehensive network of bicycle routes (Policies 5.50a-o), develop a program and provide safe pedestrian paths (Policies 5.60a-e), develop the airport to meet future needs and compatibility by utilizing the 1993 Municipal Airport Master Plan and requiring noise abatement measures to reduce impacts to land uses within the projected CNEL 65 dB contour (Policies 5.70a-c), roadway widening, reduction of travel demand by diversion of trips to modes other than the single occupant automobile and, if necessary, reduction in land use intensity within the *East Valley Corridor Specific Plan* area. Policy 5.40d calls for a 15 percent reduction in peak period vehicle trip generation by all Redlands employers. Policy 5.20f adds stronger mitigation provisions applicable to the East Valley Corridor, a major source of the Level of Service (LOS) problems. Based on monitoring of LOS changes, the policy requires revision of the *East Valley Corridor Specific Plan* if necessary to maintain LOS C or better at buildout. Reduction of intensity of development and change in use of undeveloped sites are among the revisions that may be required.

In addition to those direct traffic and transportation impacts anticipated as a result of Plan implementation, related indirect impacts are anticipated, some of which are described in other sections of the DEIR. Indirect impacts resulting from minimal consistency with the LOS standards of the Draft General Plan would include:

- Adverse effects on air quality resulting from congestion. (Section 10.0)
- Increased fuel consumption resulting from congestion. (Section 17.0)
- Increased noise and pollution and less convenient access and egress experienced by persons living on or near high volume arterials. (Section 15.0, Section 10.0)
- Property acquisition for right-of-way widening.

Direct impacts associated with arterials having significant residential frontage, high volume residential collectors, and disruptive street widenings are discussed below.

### Arterials Having Significant Residential Frontage

Table 13.1, below, shows developed residential frontages on designated arterials that will experience high volumes, and result in noise and air quality impacts. At least three developed residential frontages will have LOS E during peak hours.

Policies of the Draft General Plan that would limit trip generation in the East Valley Corridor would provide some mitigation on these arterials but would not reduce the impacts to nonsignificance. Policy 5.31d stresses maximizing the carrying capacity of arterials by controlling the number of intersections and driveways, prohibiting residential access, and requiring sufficient on-site parking to meet the needs of the project. In addition, Policies 5.32a and b require the designing of residential collectors and implementation of traffic control measures to keep certain roadway classifications below specified average daily trip volumes. In examining sites with existing residential frontage the city should examine specific acoustical measures to reduce noise and use landscaping and berms to reduce particulates in the air (please see Section 10.0, Climate, Air Quality and Wind, for more information).

**EIR Table 13.1**
**ADT and LOS on Arterials with Significant Residential Frontage**

| Arterial Segments | Average Daily Trips (in thousands) | Peak Hour Level of Service |
|---|---|---|
| San Bernardino Avenue between Texas Street and University Street | 22-45 | C-E |
| Lugonia Avenue/Mentone Boulevard from Karon Street east | 17-27 | B-E |
| Barton Road/Brookside Avenue, Alabama Street To Orange Street | 22-25 | B-C |
| Citrus Avenue, I-10 to Wabash Avenue | 13-22 | B-C |
| Texas Street, I-10 to Pioneer Avenue | 18-31 | B-F |
| Tennessee Street/San Mateo Street south of Orange Avenue | 11-19 | B |
| Orange Street, Lugonia Avenue to Santa Ana Wash | 13-22 | B-C |
| Colton Avenue, Sixth Street to Crafton Avenue | 11-12 | B-D |

Source: City of Redlands, General Plan Update, Traffic Study Technical Report, 1995.

### High Volume Residential Collectors

Church Street, University Street, Dearborn Street, Olive Avenue, Highland Avenue, and Cajon Street/Garden Street south of Cypress Avenue are redesignated from arterial to collector status by the Draft General Plan.

The following designated residential collector streets are projected to reach or exceed 5,000 ADT, the volume noted in the General Plan text as often at the limit of tolerance for residential streets. Factors that prevent establishing a fixed ADT limit include the amount of existing traffic, its speed, and how it is spread over the day, as well as housing types, lot sizes, and setbacks.

Church Street
University Street
Center Street
Cajon Street, Cypress to Palm or Highland
Ford Street, south of Sunset Drive
Garden Street
Pioneer Avenue, Texas to Church
Alessandro Road

Under Policy 5.32d, increased traffic on collectors at or above a tolerance limit is to be avoided if there are feasible and acceptable alternatives. Also, Policy 5.32g requires the provision of a network of collectors in the northeast and northwest areas of the City. Control measures to be considered include stop signs, signals, channelization, and barriers.

### Disruptive Street Right-of-Way Widenings

To achieve the projected levels of service at buildout, the Draft General Plan calls for acquisition of right-of-way along fully or partially developed segments of seven arterials. Widening need not be equal on both sides of an existing right-of-way where taking all or a larger portion of the additional right-of-way on one side would be least disruptive. No determination as to whether structures would be acquired has been made.

Sound walls and improved landscaping could provide partial mitigation at some locations. Policies 5.33a, b, c, d and e require working with Caltrans to achieve funding and timely construction of freeway and interchange improvements to accommodate future growth of the East Valley Corridor. Policy 5.31a requires the provision of adequate capacities on arterials to meet LOS standards and to avoid traffic diversion to local streets or freeways. EIR Table 13.2 indicates the additional right-of-way needed along 11.45 arterial street-miles on which 50 to 100 percent of the frontage is developed.

### Additional Traffic and Transportation Mitigation and Unmitigable Impacts

Notwithstanding the potential for error in 36-year traffic projections for buildout of EVC and Plan policies that will prevent realization of the "worst case" assumptions used for this EIR analysis, a conclusion that significant traffic impacts will accompany growth toward buildout in accord with the Draft General Plan cannot be avoided.

Conclusions regarding mitigation of noise and air quality impacts are discussed further in Sections 15.0 and 10.0, respectively. Impacts on residential arterial frontage could be reduced by building sound walls where residential side yards adjoin an arterial or by acoustic retrofitting of residential structures. Where additional right-of-way will be needed for an arterial, as on Orange Street, acquisition of entire parcels may exacerbate the problem by reducing front yards or may solve it at the cost of loss of housing stock. Each of these mitigations would have significant environmental, economic, or social effects.

**EIR Table 13.2**
**Street Right-of-Way Widenings Requiring Extensive Acquisition of Improved Property**

| Street Segment | Length (in mi.) | Land Use | Right-of-Way Width (in feet) Existing | Future Draft Plan | Future 1972 Plan |
|---|---|---|---|---|---|
| San Bernardino Avenue<br>Texas - Judson | 2.0 | Residential | 80 | 120/96 | 88 |
| Lugonia Avenue<br>Wabash - Garnet<br>(SR 38) | 2.3 | Non-residential/<br>Residential | 80 | 96 | 100 |
| Redlands Boulevard<br>California-Colton | 1.15 | Non-residential | 75/90 | 120 | 100 |
| Colton Avenue<br>Redlands-Orange | 1.5 | Non-residential/<br>Residential | 90 | 96 | 88 |
| Texas Street<br>San Bernardino-Colton | 1.0 | Residential | 80/85 | 96 | 88 |
| Orange Street<br>San Bernardino-Colton | 1.0 | Residential/<br>Non-residential | 70 | 96 | 88 |
| Wabash Avenue | | | | | |
| San Bernardino-Lugonia | 0.5 | Non-residential | 55 | 72 | 88 |
| Colton-I-10 | 2.0 | Residential (half) | 60 | 72 | 88 |
| Total | 11.45 | | | | |

Source: City of Redlands, General Plan Update, Traffic Study Technical Report, 1995.

Alternatively, a decision not to widen arterial streets would have at least short term adverse air quality impacts. Some traffic that would use Mill Creek Road, San Timoteo Canyon Road, or Orange Street if traffic capacity were available would attempt to bypass the Planning Area or to make greater use of the freeways even if they are operating at low service levels. If access to the East Valley Corridor is perceived as difficult, the rate of development may slow and landowners may seek development that places less demand on the street system.

Development of the East Valley Corridor with a business park and regional shopping center having a total of 90,000 jobs that must rely for access mainly on an existing street and freeway system will create significant environmental impacts for which more than partial mitigation at the General Plan level is not feasible.

Land use alternatives to the Draft General Plan analyzed in Section 19.0 would reduce traffic impacts to nonsignificance except at freeway interchanges within the *East Valley Corridor Specific Plan* area. The preferred traffic alternative (#5) would reduce the East Valley Corridor retail square footage by 69% and office/industrial square footage by 37% and substitute housing at an average of 2.7 units per gross acre resulting in improved traffic Level of Service at most locations to C or better.

# 14.0 AIRPORT SAFETY

Redlands General Plan / EIR

## 14.0 AIRPORT SAFETY

**Setting.** San Bernardino International Airport, located to the northwest of the City of Redlands and Redlands Municipal Airport have safety impacts that may limit development in portions of the Planning Area. For a full discussion of existing conditions, consult MEA, Section 13.0, Airport Safety. This section contains information on the existing safety issues and concerns pertaining to the San Bernardino International Airport and the Redlands Municipal Airport. In addition, the airport safety section of the MEA contains references to studies, documents and plans conducted for the relevant airport facilities.

### Future Development, Airport Safety Impacts and Mitigation Provided by Plan Policies

Redlands Municipal Airport

Redlands Municipal Airport will need to expand to meet the future demands of its users. The 1993 Master Plan for the Redlands Municipal Airport discusses the preferred alternative with recommendations. The recommendations include extending the runway to a length of 5,310 feet, acquiring avigation easements for future runway protection zones, constructing additional taxiways to support landside development including hangars, aprons, auto parking lots, and an aviation terminal. These facilities will meet the forecast demands of small general aviation single and twin engine aircraft through the year 2015. This change in operations at the facility may effect land uses adjacent to the airport. Land uses including public facilities (schools, hospitals, auditoriums) and residential areas may be effected by airport activities if they are located within the 60 or 65 CNEL noise contours. Policy 8.80a requires the maintenance of standards in safety areas so as to minimize impacts on land uses within the 60 and 65 CNEL noise contours. Also, the airport is situated in such a way that flights take off and land over the Santa Ana Wash thus minimizing any land use impacts.

The State is currently requiring that a Comprehensive Airport Land Use Plan (CALUP) which evaluates the surrounding land use in light of airport operations be developed for all general aviation airports. The CALUP must be reviewed and approved by an Airport Land Use Commission (ALUC) or an officially recognized alternative board. Redlands has entered into a contract for the preparation of a CALUP. Policy 5.70g of the General Plan requires the use of the CALUP for the review of development projects within the City.

San Bernardino International Airport (formerly Norton Air Force Base)

The Inland Valley Development Agency was organized in 1990 by the cities of San Bernardino, Colton, Loma Linda, and the County of San Bernardino to assist in the reuse and redevelopment of the Norton Air Force Base as a result of the closure. Since the closure of Norton Air Force Base, the new owners have been evaluating the possibility of a civilian airport facility. In 1993, a Master Plan for the reuse of the facility was published and is to be used as the basis for marketing the opportunities of the Base. The Master Plan calls for many improvements including additions to the circulation system, changes in the General Plans of surrounding communities, and flexible land uses to include a variety of commercial/industrial type of uses. Some of the circulation improvements are currently underway. Once in full operation, the San Bernardino International Airport may effect some land uses in the City of Redlands due to noise created by aircraft during overflights after take-offs. These impacts are mitigated and are further discussed below.

The most significant impacts associated with airport planning are noise and the establishment of clear zones to minimize crash hazards. The proposed San Bernardino International Airport will not develop specific flight paths and resultant noise contours until air service contacts are completed. Preliminary forecasts projecting noise contours for the 60 and 65 CNEL, however, do not indicate any adverse noise impacts to the Planning Area. In addition, the 1993 Redlands Municipal Airport Master Plan EIR determined safety impacts associated with this facility to be insignificant.

Policy 8.80a in the Airport Safety Section of the Health and Safety Element of the General Plan incorporates standards that are consistent with the Aviation Safety Component of the San Bernardino County General Plan. These standards are identified as "Safety Areas".

The Draft Redlands General Plan is consistent with the standards for Safety Areas 1 through 3 as identified in the Airport Safety Section of MEA Section 13. Prior to the closure of the Norton Air Force Base, existing conditions and the Draft Plan were inconsistent with standards for Safety Area 4 which applies to the area within five miles of the Norton Air Force Base. Schools, nursing homes, libraries, churches, and hospitals were listed as "clearly unacceptable" within this radius which extends south to Highland Avenue. The Draft General Plan locates three new schools within the former Safety Area 4. Since the closure of Norton Air Force Base, and conversion to a civilian airport, consistency with Safety Area 4 is no longer required. Schools, nursing homes, libraries, churches, and hospitals are acceptable land uses. While not yet finalized, preliminary noise contours projected for the San Bernardino International Airport do not show the 60 or 65 CNEL noise contours intersecting the Planning Area.

The maximum "horizontal surface" radius for a civil airport with an instrument runway is 10,000 feet. Some ALUCs restrict density and prohibit places of assembly within this overflight zone. No significant impacts are anticipated with the proposed General Plan relating to airport hazards.

**Additional Airport Safety Mitigation and Unmitigable Impacts**

Given the closure of Norton AFB in 1994 and the determination of negligible noise impacts as a result of its conversion to civilian uses, and the determination that the Redlands Municipal Airport will not have significant impacts upon the Planning Area and the adherence of land uses consistent with the guidelines stipulated by the "Safety Area" regulations, airport safety issues cannot be judged as a significant impact of the General Plan.

It should be noted that although preliminary forecasts have predicted no significant noise impacts to the Planning Area due to the conversion of Norton AFB to civilian uses this can only be definitely determined when actual plans for a defined facility are assessed.

**Significant Unavoidable Adverse Impacts of the Project**

Given the information above, no significant unavoidable adverse impacts are anticipated.

# 15.0 NOISE

Redlands General Plan / EIR

## 15.0 NOISE

**Setting.** Noise levels adjacent to roadways vary with the volume of traffic, the mean vehicular speed, the truck mix, and the road cross-section. Build-out noise levels were projected for the proposed General Plan adjacent to 57 surface street links and 12 freeway links in the City of Redlands Planning Area. The projections indicate that some of the links that are expected to experience a significant increase in traffic volumes will exhibit lower average vehicle speeds that offset, to some extent, the noise increases that would otherwise be expected. The Southern Pacific Transportation Company has a main railroad line running through the southwest corner of Redlands with approximately twenty-eight trains per day passing through the San Timoteo Canyon. Most of the trains are freight operations that occur during the daytime, however, there are a few evening and nighttime freight operations as well as Amtrak service. The AT&SF Railroad Company also has a railroad line and other spur lines that pass through the City of Redlands with occasional freight traffic. Noise levels along the AT&SF railroad lines are considered insignificant. The Redlands Municipal Airport is a city-owned general aviation facility. The 1993 Redlands Municipal Airport Master Plan projects an increase from 65,100 operations in 1991 to 102,000 operations in 2015. Projected noise contours are also shown in the Master Plan. The following is a summary of a noise study which was conducted by Endo Engineering, and should be consulted for a full understanding of the noise aspects in the Planning Area.

### Noise Impacts and Mitigation Provided by Plan Policy

Factors Affecting Roadway Noise

Noise levels adjacent to roadways vary with the volume of traffic, the mean vehicular speed, the truck mix, and the road cross-section. For instance, increasing the vehicle speed from 35 to 45 mph along a major roadway raises the adjacent noise levels approximately 2.7 dBA. Raising the speed from 45 to 50 mph increases adjacent noise levels by 1.0 dBA. A speed increase from 50 mph to 55 mph increases adjacent noise levels by 0.9 dBA. Consequently, lowering motor vehicle speeds can have a significant positive impact in terms of reducing adjacent noise levels.

The truck mix on a given roadway also has a significant effect on the adjacent noise levels. As the number of trucks increases and becomes a larger percentage of the total vehicle volume, the adjacent noise levels increase. This effect is more pronounced if the number of heavy duty (3+ axle) trucks is large when compared to the number of medium duty (2 axle) trucks.

Future Traffic Noise Levels

The traffic impacts associated with the proposed General Plan were assessed with a computerized traffic model by DKS Associates, Inc. Based upon their findings, build-out noise levels were projected for the proposed General Plan adjacent to 57 surface street links and 12 freeway links in the City of Redlands Planning Area.

The projections indicate that some of the links that are expected to experience a significant increase in traffic volumes will exhibit lower average vehicle speeds that offset, to some extent, the noise increases that would otherwise be expected. The noise levels generated by motor vehicles increase as their speed increases. The maximum noise levels on a roadway link are therefore determined from the speed and the number of vehicles using the roadway link. When a roadway link is extremely congested, speeds are lower and noise levels will be lower than when a free-flow condition is achieved. The analysis herein represents a "worst cast" scenario since 45 mph speeds were assumed for all future surface streets evaluated and the noise levels projected for the most congested links may never be realized if congested speeds drop below 45 mph.

Table 15.1 provides the traffic noise levels along the City's freeways and arterials upon buildout of the proposed General Plan. Assuming a sound propagation rate of 4.5 DBA with each doubling of distance, the locations of the future 70 CNEL, 65 CNEL and 60 CNEL noise contours used for land use compatibility purposes have been determined. The computer model input parameters assumed for the buildout analyses are detailed in the Appendix of the Noise Element Technical Background Study.

Table 15.2 shows the increase in noise levels from current to General Plan buildout. The increase in noise levels experienced by sensitive noise receptors adjacent to 28 of the 64 arterial streets evaluated will exceed the four or more dB defined by Policy 9v as "significant" in making a determination of impact under CEQA.

Typical and Design Noise Levels

Noise levels adjacent to roadways vary with the volume of traffic, the mean vehicular speed, the truck mix, and the road cross-section. Nomographs are provided in the Noise Element Technical Background Study for a typical master planned roadway by type that allows the CNEL at the right-of-way to be determined from the daily two-way traffic volume and the speed of the vehicles.

For example, a 6-lane major arterial roadway carrying 20,000 ADT with a posted speed limit of 50 mph would generate approximately 70.3 CNEL at the right-of-way. Lowering the speed to 45 mph would reduce the CNEL at the right-of-way to 69.1 dBA. Similarly, at a speed of 40 mph, the CNEL at the right-of-way would be 67.8 dBA.

A 4-lane major arterial street carrying 20,000 ADT at 45 mph would generate 70.2 CNEL at the right-of-way if the truck mix were 2.58 percent of the ADT. The CNEL would increase to 72.0 dBA at the right-of-way if the truck mix were 10 percent of the ADT. A 5 percent truck mix would result in 70.9 CNEL at the right-of-way.

It is recommended that ultimate noise contours at the design capacity of each facility be used for planning purposes and refined when detailed site-specific acoustic reports are prepared for new developments. Until that time, Figure 2-4 of the Noise Element Technical Background Study can serve as a general planning guide to determine the potential "worst case" future noise levels and the setbacks required to insure an acceptable noise environment for planned land uses.

Figure 2-4 of the Noise Element Technical Background Study provides design noise levels adjacent to typical major, primary and secondary arterials. The nomograph assumes the ultimate daily design capacity for each roadway type as well as typical design speeds and a 2.58 percent truck mix. Figure 2-4 of the Noise Element Technical Background Study can be used to determine typical CNEL contours between 50 and 300 feet from the roadway center-lines, assuming flat terrain and no intervening barriers or buildings.

Railroad Noise

The Southern Pacific Transportation Company has a main railroad line running through the southwest corner of Redlands. This is the main Southern Pacific line serving Los Angeles. Twenty-eight trains per day typically pass along this line through the San Timoteo Canyon. Most of the trains are freight operations that occur during the daytime, however, there are a few evening and nighttime freight operations as well as Amtrak service.

**Table 15.1**
**General Plan Buildout Exterior Noise Exposure**
**Adjacent to City Roadways**

| Roadway | A.D.T.[a] (Veh/Day) | CNEL[b] @ 100 Feet | Distance to Contours (Ft.)[c] 70 dBA | 65dBA | 60 dBA |
|---|---|---|---|---|---|
| **Interstate 10** | | | | | |
| Mtn View-California | 238,000 | 82.6 | 505 | 1081 | 2325 |
| California-Alabama | 235,000 | 82.5 | 498 | 1065 | 2290 |
| Alabama-SR 30 | 205,000 | 81.9 | 455 | 971 | 2089 |
| SR 30-Orange | 208,000 | 80.8 | 435 | 931 | 2002 |
| Orange-University | 206,000 | 81.1 | 455 | 974 | 2097 |
| University-Cypress | 195,000 | 80.8 | 435 | 931 | 2002 |
| Cypress-Ford | 198,000 | 80.9 | 442 | 945 | 2033 |
| Ford-Redlands | 210,000 | 81.2 | 462 | 989 | 2129 |
| Redlands-Wabash | 186,000 | 80.6 | 422 | 903 | 1942 |
| Wabash-Yucaipa | 180,000 | 80.7 | 428 | 917 | 1972 |
| **State Route 30** | | | | | |
| I 10-San Bernardino | 85,000 | 75.9 | 236 | 504 | 1084 |
| North of San Bernardino | 92,000 | 75.1 | 209 | 446 | 959 |
| **Palmetto** | | | | | |
| California-Alabama | 19,000 | 65.0 | 49 | 100 | 213 |
| **San Bernardino Ave.** | | | | | |
| Mtn View-Alabama | 33,000 | 67.7 | 75 | 145 | 304 |
| Alabama-Orange | 51,000 | 70.3 | 104 | 212 | 451 |
| Orange-Church | 25,000 | 66.2 | 60 | 119 | 252 |
| Church-Wabash | 24,000 | 66.0 | 56 | 116 | 248 |
| Wabash-Mill Creek | 12,000 | 63.0 | R/W | 75 | 157 |
| **Lugonia Ave./Mentone Blvd.** | | | | | |
| Mtn View-Alabama | 30,000 | 67.0 | 66 | 134 | 285 |
| Alabama-Orange | 36,000 | 67.8 | 73 | 151 | 322 |
| Orange-Wabash | 22,000 | 65.6 | 53 | 109 | 233 |
| Wabash-Garnet | 19,000 | 65.0 | 49 | 100 | 213 |
| **Redlands Blvd.** | | | | | |
| California-Alabama | 39,000 | 69.2 | 90 | 180 | 382 |
| Alabama-Colton | 53,000 | 70.5 | 107 | 219 | 465 |
| Colton-Texas | 33,000 | 68.4 | 82 | 160 | 338 |
| Texas-Citrus | 30,000 | 67.7 | 72 | 149 | 317 |
| Citrus-Highland | 32,000 | 68.0 | 75 | 155 | 332 |
| Highland-I 10 Fwy | 22,000 | 66.4 | 61 | 123 | 260 |
| **Colton Ave.** | | | | | |
| Redlands-Sixth | 23,000 | 66.5 | 60 | 125 | 267 |
| Sixth-University | 12,000 | 62.9 | R/W | 73 | 156 |
| University-Dearborn | 11,000 | 62.5 | R/W | 68 | 147 |
| Dearborn-Crafton | 9,000 | 61.6 | R/W | 60 | 128 |
| **Barton/Brookside/Citrus** | | | | | |
| California-Terracina | 33,000 | 68.4 | 82 | 160 | 338 |
| Terracina-Orange | 27,000 | 66.6 | 63 | 126 | 268 |
| Orange-Judson | 24,000 | 66.7 | 62 | 129 | 276 |
| Judson-Wabash | 14,000 | 64.3 | 45 | 90 | 191 |
| Wabash-Crafton | 10,000 | 62.8 | R/W | 71 | 154 |

a. A.D.T. means current average daily two-way traffic volume.
b. CNEL values are given at 100 feet from all roadway center-lines (see the Appendix for assumptions).
c. All distances are measured from the centerline. R/W means the contour falls within the right-of-way.

**Table 15.1 (Continued)**
**General Plan Buildout Exterior Noise Exposure**
**Adjacent to City Roadways**

| Roadway | A.D.T.[a] (Veh/Day) | CNEL[b] @ 100 Feet | Distance to Contours (Ft.)[c] 70 dBA | 65dBA | 60 dBA |
|---|---|---|---|---|---|
| **Cypress Ave.** | | | | | |
| Terracina-Citrus | 12,000 | 63.6 | R/W | 81 | 172 |
| **California St.** | | | | | |
| Palmetto-Lugonia | 40,000 | 68.6 | 84 | 165 | 348 |
| Lugonia-Redlands | 58,000 | 70.2 | 103 | 209 | 444 |
| Redlands-Barton | 23,000 | 66.2 | R/W | 118 | 243 |
| **Nevada** | | | | | |
| San Bernardino-Lugonia | 22,000 | 65.6 | 53 | 109 | 233 |
| Lugonia-Redlands | 26,000 | 66.3 | 59 | 121 | 259 |
| Redlands-Barton | 18,000 | 64.7 | 47 | 96 | 203 |
| **Alabama St./Palm** | | | | | |
| North of S. Bernardino | 38,000 | 69.0 | 88 | 175 | 370 |
| S.Bernardino-I 10 Fwy | 58,000 | 70.9 | 113 | 232 | 494 |
| I 10 Fwy-Redlands | 47,000 | 70.0 | 100 | 203 | 431 |
| Redlands-Barton | 37,000 | 68.9 | 87 | 173 | 365 |
| **Tennessee/San Mateo** | | | | | |
| Lugonia-Brookside | 29,000 | 67.5 | 69 | 146 | 312 |
| Brookside-Highland | 20,000 | 65.9 | 55 | 114 | 244 |
| **Texas/Center** | | | | | |
| Pioneer-Cólton | 28,000 | 66.6 | 61 | 127 | 272 |
| Colton-Brookside | 18,000 | 65.4 | 52 | 106 | 226 |
| Brookside-Highland | 13,000 | 63.9 | R/W | 85 | 182 |
| **Eureka St.** | | | | | |
| Pearl-Citrus | 10,000 | 62.2 | R/W | 66 | 139 |
| **Orange St./Cajon** | | | | | |
| North of Pioneer | 22,000 | 66.3 | 59 | 121 | 259 |
| Pioneer-Lugonia | 21,000 | 66.1 | 57 | 118 | 252 |
| Lugonia-I 10 Fwy | 27,000 | 66.5 | 60 | 125 | 267 |
| I 10 Fwy-Citrus | 21,000 | 65.4 | 52 | 106 | 226 |
| Citrus-Highland | 14,000 | 63.5 | R/W | 80 | 171 |
| Highland-Elizabeth | 9,000 | 61.6 | R/W | 60 | 128 |
| **Judson St./Ford St.** | | | | | |
| Pioneer-Colton | 8,000 | 61.1 | R/W | 55 | 118 |
| Colton-I 10 Fwy. | 10,000 | 62.8 | R/W | 71 | 154 |
| **Wabash Ave.** | | | | | |
| Pioneer-Lugonia | 7,000 | 60.5 | R/W | 50 | 108 |
| Lugonia-Citrus | 9,000 | 61.6 | R/W | 60 | 128 |
| Citrus-I 10 Fwy. | 13,000 | 63.2 | 36 | 76 | 163 |
| **Crafton** | | | | | |
| San Bernardino-5th | 9,000 | 61.6 | R/W | 60 | 128 |
| **Sand Canyon** | | | | | |
| East of Crafton | 12,000 | 63.0 | R/W | 75 | 157 |
| **San Timoteo Cyn. Road** | | | | | |
| Brookside-Alessandro | 18,000 | 65.3 | 49 | 105 | 225 |
| Alessandro-Live Oaks | 20,000 | 65.8 | 53 | 113 | 243 |

a. A.D.T. means current average daily two-way traffic volume.
b. CNEL values are given at 100 feet from all roadway center-lines (see the Appendix for assumptions).
c. All distances are measured from the centerline. R/W means the contour falls within the right-of-way.

Table 15.2
Increase in Motor Vehicle Noise

| Roadway | CNEL at 100 Feeta 1994 | CNEL at 100 Feeta G.P. Buildout | Increase (dBA) |
|---|---|---|---|
| **Interstate 10** | | | |
| Mtn View-California | 79.4 | 82.6 | 3.2 |
| California-Alabama | 79.4 | 82.5 | 3.1 |
| Alabama-SR 30 | 79.4 | 81.9 | 2.5 |
| SR 30-Orange | 78.7 | 80.8 | 2.1 |
| Orange-University | 77.6 | 81.1 | 3.5 |
| University-Cypress | 76.8 | 80.8 | 4.0 |
| Cypress-Ford | 76.9 | 80.9 | 4.0 |
| Ford-Redlands | 76.5 | 81.2 | 4.7 |
| Redlands-Wabash | 76.8 | 80.6 | 3.8 |
| Wabash-Yucaipa | 77.1 | 80.7 | 3.6 |
| **State Route 30** | | | |
| I 10-San Bernardino | 73.2 | 75.9 | 2.7 |
| **Palmetto** | | | |
| California-Alabama | 52.1 | 65.0 | 12.9 |
| **San Bernardino Ave.** | | | |
| Mtn View-Alabama | 58.1 | 67.7 | 9.6 |
| Alabama-Orange | 61.8 | 70.3 | 8.5 |
| Orange-Church | 62.5 | 66.2 | 3.7 |
| Church-Wabash | 56.8 | 66.0 | 9.2 |
| Wabash-Mill Creek | 55.1 | 63.0 | 7.9 |
| **Lugonia Ave./Mentone Blvd.** | | | |
| Mtn View-Alabama | 56.8 | 67.0 | 10.2 |
| Alabama-Orange | 60.5 | 67.8 | 7.3 |
| Orange-Wabash | 63.0 | 65.6 | 2.6 |
| Wabash-Garnet | 61.2 | 65.0 | 3.8 |
| **Redlands Blvd.** | | | |
| California-Alabama | 66.0 | 69.2 | 3.2 |
| Alabama-Colton | 66.2 | 70.5 | 4.3 |
| Colton-Texas | 65.7 | 68.4 | 2.7 |
| Texas-Citrus | 67.3 | 67.7 | 0.4 |
| Citrus-Highland | 65.0 | 68.0 | 3.0 |
| Highland-I 10 Fwy | 62.0 | 66.4 | 4.4 |
| **Colton Ave.** | | | |
| Sixth-University | 62.1 | 62.9 | 0.8 |
| University-Dearborn | 61.1 | 62.5 | 1.4 |
| Dearborn-Crafton | 59.8 | 61.6 | 1.8 |
| **Barton/Brookside/Citrus** | | | |
| California-Terracina | 65.0 | 68.4 | 3.4 |
| Terracina-Orange | 63.7 | 66.6 | 2.9 |
| Orange-Judson | 64.0 | 66.7 | 2.7 |
| Judson-Wabash | 64.9 | 64.3 | -0.6 |
| Wabash-Crafton | 58.8 | 62.8 | 4.0 |
| **Cypress Ave.** | | | |

| | | | |
|---|---|---|---|
| Terracina-Citrus | 62.4 | 63.6 | 1.2 |

a. All distances are measured from the centerline.

Table 15.2 (Continued)
Increase in Motor Vehicle Noise

| Roadway | CNEL at 100 Feeta 1994 | CNEL at 100 Feeta G.P. Buildout | Increase (dBA) |
|---|---|---|---|
| **California St.** | | | |
| Palmetto-Lugonia | 52.1 | 68.6 | 16.5 |
| Lugonia-Redlands | 58.1 | 70.2 | 12.1 |
| Redlands-Barton | 60.5 | 66.2 | 5.7 |
| **Nevada** | | | |
| San Bernardino-Lugonia | 52.1 | 65.6 | 13.5 |
| Lugonia-Redlands | 58.1 | 66.3 | 8.2 |
| Redlands-Barton | 52.1 | 64.7 | 12.6 |
| **Alabama St./Palm** | | | |
| North of S. Bernardino | 63.4 | 69.0 | 5.6 |
| S.Bernardino-I 10 Fwy | 64.7 | 70.9 | 6.2 |
| I 10 Fwy-Redlands | 67.3 | 70.0 | 2.7 |
| Redlands-Barton | 66.2 | 68.9 | 2.7 |
| **Tennessee/San Mateo** | | | |
| Lugonia-Brookside | 64.3 | 67.5 | 3.2 |
| Brookside-Highland | 62.4 | 65.9 | 3.5 |
| **Texas/Center** | | | |
| Pioneer-Colton | 58.1 | 66.6 | 8.5 |
| Colton-Brookside | 63.3 | 65.4 | 2.1 |
| **Eureka St.** | | | |
| Pearl-Citrus | 58.1 | 62.2 | 4.1 |
| **Orange St./Cajon** | | | |
| North of Pioneer | 58.8 | 66.3 | 7.5 |
| Pioneer-Lugonia | 61.2 | 66.1 | 4.9 |
| Lugonia-I 10 Fwy | 64.5 | 66.5 | 2.0 |
| I 10 Fwy-Citrus | 65.6 | 65.4 | -0.2 |
| Citrus-Highland | 62.9 | 63.5 | 0.6 |
| **Judson St./Ford St.** | | | |
| Pioneer-Colton | 55.1 | 61.1 | 6.0 |
| Colton-I 10 Fwy. | 59.7 | 62.8 | 3.1 |
| **Wabash Ave.** | | | |
| Pioneer-Lugonia | 55.1 | 60.5 | 5.4 |
| Lugonia-Citrus | 59.8 | 61.6 | 1.8 |
| Citrus-I 10 Fwy. | 55.1 | 63.2 | 8.1 |
| **Crafton** | | | |
| San Bernardino-5th | 59.8 | 61.6 | 1.8 |
| **Sand Canyon** | | | |
| East of Crafton | 60.6 | 63.0 | 2.4 |

| | | | |
|---|---|---|---|
| **San Timoteo Cyn. Road** | | | |
| Brookside-Alessandro | 57.5 | 65.3 | 7.8 |

a. All distances are measured from the centerline.

The AT&SF Railroad Company also has a railroad line and other spur lines that pass through the City of Redlands. The line enters and exits the City a number of times. To the City's west, the line crosses the City boundary at Mountain View Avenue (north of I-10), at the intersection of Nevada Street and the southern City boundary, and near the intersection of Alabama Street and Redlands Boulevard. The line crosses the City's eastern boundary near the intersection of Colton Avenue and the City line, and turns north to Mentone. This line has only occasional freight traffic. Noise levels along the AT&SF railroad lines are considered insignificant.

Noise exposure contours along the Southern Pacific Transportation Company main railroad line were determined from the number and type of trains using the line, the magnitude and duration of each train pass, and the time of day when the train passes. Using the procedures developed by Wyle Laboratories, an analysis of the train operations was performed to determine existing noise levels.

At 100 feet from the railway centerline, the noise level was determined to be 72.8 CNEL. The noise level at 200, 400, and 800 feet from the tracks is projected to be 68.8, 63.3, and 57.3 CNEL, respectively. The 65 CNEL contour is approximately 320 feet from the tracks, and the 60 CNEL contour is approximately 600 feet from the tracks. No measurements of railroad noise were made.

Contours for long-term conditions require projections of future rail use, speed, time of use, quality of track, etc. Since the Southern Pacific Transportation Company has no projections for future operations, it is not possible at this time to accurately predict future conditions. Proposed developments near the main railroad line should be required to address noise impacts from the railroad on the proposed project.

Aircraft Noise

The Redlands Municipal Airport is a city-owned general aviation facility and is located north of Pioneer Avenue, between Judson Street to the west and Wabash Avenue to the east. The adopted 1993 Redlands Municipal Airport Master Plan projects an increase from 65,100 operations in 1991 to 102,000 operations in 2015. In addition, the Plan includes existing and 2015 noise contours from the airport as shown in Figure 3-1 and 3-2 of the Noise Element Technical Background Study.

Various policies in the General Plan provide mitigation for reducing noise impacts. Policies 9a-c include provisions to protect public health and welfare by eliminating existing noise problems where feasible, incorporating noise considerations into land use planning decisions, and supporting measures to reduce noise emissions by motor vehicles, aircraft, and trains. Policy 9d recommends that the City adopt a Community Noise Ordinance to control non-transportation noise impacts.

Other policies (9e-o) require the use of the criteria established in the General Plan to assess the compatibility of proposed land uses with projected noise environments, requiring a noise impact evaluation as part of the review process based on noise measurements at the site for all projects in Noise Referral Zones as specified in the General Plan, establishing a periodic noise monitoring program, minimizing noise impacts through proper design of streets, requiring construction of barriers to mitigate sound emissions where necessary, requiring the inclusion of noise mitigation measures in the design of new roadway projects, ensuring effective enforcement of City, State and federal noise standards, mitigating noise conflicts between land uses, designating a noise coordinator to ensure the continued operation of noise enforcement efforts, providing quick responses to complaints and rapid abatement of noise nuisances, and establishing noise guidelines for City purchasing policy to take advantage of federal regulations and labeling requirements.

Coordinating with the California Occupational Safety and Health Administration (OSHA) to provide noise requirements within the City, providing for continued evaluation of truck movements in the City to provide effective separation from residential or other noise sensitive land uses, encouraging the enforcement of State Motor Vehicle noise standards through coordination with the California Highway Patrol and Redlands Police Department, require mitigation to ensure that indoor noise levels for residential uses do not exceed 45 decibels, require proposed commercial projects near existing residential land uses to demonstrate compliance with the Community Noise

Ordinance prior to approval, require all new residential construction to be constructed near existing sources of non-transportation noises, limit hours of construction where site related noise is audible beyond the site boundary, work with Caltrans to establish sound walls along freeways where appropriate, and minimize impacts of loud trucks by requiring that maximum noise levels due to single events be controlled to 50 decibels in bedrooms and 55 decibels in other habitable spaces.

The City also has a policy in determining significant impacts under the CEQA relating to noise. An impact is considered significant if an increase in exposure of four or more decibels if the resulting noise level would exceed that described as clearly compatible for the affected land use as established in the Noise Section of the General Plan, and any increase of six decibels or more due to the potential for adverse community response.

**Additional Noise Mitigation and Unmitigable Impacts**

The current noise exposure resulting from motor vehicles on area roadways ranges from a low of 53.1 CNEL to a high of 79.4 CNEL. The 70 CNEL noise contour presently falls within the right-of-way along eighty-one percent of the surface street links analyzed. The noise level at 100 feet from the Interstate 10 centerline currently ranges from 76.5 to 79.4 CNEL. The current noise level at 100, 200, 400, and 800 feet from the railroad tracks is projected to be 72.8, 68.8, 63.3, and 57.3 CNEL, respectively.

Introduction of the San Bernardino International Airport (at the old Norton Air Force Base) will result in higher noise levels in the City of Redlands, even with the anticipated use of quieter aircraft. Plans for the future development of this airport have not been established; therefore, noise contours are not available at this time.

While numerous policies throughout the General Plan are intended to minimize the effect of noise, impacts from noise cannot be entirely avoided and must be considered significant and unavoidable. Additional mitigation and unmitigable impacts related to noise issues are discussed in EIR Section 13.0, Traffic.

# 16.0 COMMUNITY SERVICES

Redlands General Plan / EIR

## 16.0 COMMUNITY SERVICES

Summary: Water, sewer, parks, schools, police, fire, emergency management, and waste management and recycling are considered in this Section. These community services are provided by a variety of City departments, private companies, districts and agencies. Provision of these community services is generally considered adequate at this time. For a full discussion of existing conditions, consult the individual subsection within MEA Section 15.0, Community Services.

## 16.1 Water

Water supply and conservation are described in DEIR Section 7.2, Water Supply and Conservation. Water quality issues are described in DEIR Section 7.3, Water Quality.

## 16.2 Sewer

### Environmental Setting

Wastewater generated by sewered development within the Planning Area is treated at the City's plant on the south side of the Santa Ana River Wash at Nevada Street. The rest of the Planning Area is served by septic systems. Septic systems are allowed by City Public Services Code 13.44.080. That code requires installation of dry sewer systems in addition to septic systems to facilitate a new development's eventual hook-up to a city sewer system.

While the above agencies are the basic providers of existing sewage and collection, the California Regional Water Quality Board, Santa Ana Region, has planning and regulatory authority for any activities directly affecting surface or groundwater quality.

Current average flow is about 6 million gallons per day (mgd), and treatment capacity of the City's plant is about 9 mgd. The wastewater flow is 226 gallons per dwelling unit per day. The Redlands Wastewater Collection System Master Plan, prepared in 1985 by Camp Dresser and McKee and the East Valley Corridor Facilities Specific Plan, prepared in 1988 by Metcalf and Eddy are guides for the physical development of the Planning Area's sewer system.

### Sewer Impacts and Mitigation

Implementation of the proposed Plan will create additional demands on the existing sewer system due to potential increase in new residential and commercial/industrial structures in the Planning Area. The Wastewater Collection System Master Plan was designed with an ultimate buildout population of 180,000, approximately twice the population projected under the Draft General Plan and a projected population of 79,000 in the year 2005. The East Valley Corridor Facilities Specific Plan, prepared three years later, projects ultimate wastewater flow potential as high as 24 mgd at full annexation and buildout. The General Plan assumes that any subsequently adopted Capital Improvement Programs will support implementation of the Wastewater Collection System Master Plan and the East Valley Corridor Specific Plan. Implementation of these plans will adequately provide infrastructure to serve proposed development. As per the General Plan Amendment No. 38, development proposals in non-sewered portions of the Planning Area shall address the means of managing wastewater by providing independent solutions to the City and Regional Water Quality Board. These two agencies shall assess the viability of these proposals to provide for wastewater disposal.

### Additional Sewer Impacts, Mitigation and Unmitigable Impacts

There are no unmitigable significant adverse impacts to the sewer system as a result of implementation of the General Plan.

## 16.3 Parks

### Environmental Setting

There are 47 existing park facilities within the City of Redlands and the Planning Area. Twenty-two are sites in use, and ten are acquired but undeveloped parks. There are also 15 school sites which are evaluated as one-half of a credit toward meeting the acres per 1000 residents standard consistent with the 1987 Recreation Element. There are ten proposed but undeveloped parks and one proposed elementary school site. The Redlands City Council has established policy to provide 5 to 6 acres of parkland per 1000 residents. Acreage which is no applicable to this standard includes steep hills, flood control area, and pocket parks.

There are five categories of parkland within the Planning Area. The standards for these categories are elaborated upon in the Open Space and Conservation Element of the General Plan, Section 7.0. These categories are; Pocket parks, Neighborhood parks, Community parks, City parks and Regional parks. Other areas included in the park designation are trails, flood control areas, medians, greenbelts and scenic viewpoints. The existing and proposed park acreage in the City and Planning Area is shown on Table 16.1 as follows:

| | Neighborhood | Community | City | Regional | City Groves | Other | Property Applicable to Acres/1000 Residents Standard |
|---|---|---|---|---|---|---|---|
| Existing | 97.5 acres | 175.7 acres | 90 | 80 | 101.5 | 373.4 acres | 477.4 acres |
| Proposed | 50 | 65 | 40 | 75 | 0 | 101.5 | 260.7 |
| Total at Buildout | 147.5 | 240.7 | 130 | 155 | 101.5 | 484.1 | 738.1 |

### Golf Courses

The General Plan proposes three additional 18-hole golf courses to the existing private Redlands Country Club course. These additional courses would bring the ratio up to one golf course per 25,000 residents as per the open space standard. One site has been relocated from the Judson Street/Pioneer Avenue area to a large parcel east of Wabash Avenue (160 acres). Another course site is proposed in the Greenspot area (204 acres) and the other is proposed in San Timoteo Canyon (140 acres).

### Trails

The City of Redlands encourages the use of trails (pedestrian, cycling, and equestrian) within the City and the Planning Area. The City Council has appointed a Trails Committee and has adopted a Trails Map (October 7, 1992). This map identifies general locations of Regional Trunk Trails and Primary Community Trails within the Planning Area. These are two of the four major types of trails described in the Trails Master Plan. The Master Plan is described in more detail in the General Plan Trails Component of the Open Space and Conservation Element, Section 7.0.

### Park Impacts and Mitigation

Implementation of the General Plan will create additional demands on existing park and recreational services due to potential increase in new residential structures in the City. As per the City of Redlands Community Services Department, youth and adult sports fields are currently at capacity, however, open space and passive recreational facilities are generally considered adequate.

The policies within the Open Space and Conservation Element of the General Plan are designed to mitigate the potential impacts identified above. Guiding Policies 7.10a. 7.10b, 7.10c and Implementing Policy 7.10j encourage creation of an adequate, diverse, and accessible park system for all present and future residents. Guiding Policy 7.10d identifies the needs of special user groups and requires that these needs be incorporated into park and recreation facility development. Guiding Policy 7.10e and Implementing Policies 7.10l and 7.10m encourage developer fee payment or park dedication to ensure a public park system for the community and the system's expected impact by nonresidential use employees. Guiding Policy 7.10f encourage preservation of natural areas within and outside the Planning Area as regional parks or preserves. Guiding Policy 7.10g and Implementing Policy 7.10p require periodic review of the park standards, needs and available funding mechanisms. The City is encouraged to continue cooperative efforts with the Redlands Unified School District through joint use agreements in Guiding Policy 7.10h. Guiding Policy 7.10i and Implementing Policies 7.10k, 7.10n, and 7.10o encourage sharing park development and improvement costs, seeking State and Federal assistance in implementing parks proposals and using available techniques in continuation of the dedication of a linear park along the Santa Ana River Bluff and the development of a linear park along the Zanja and railroad right-of-way. The Guiding and Implementing Policies in 7.11 focus on standards and guidelines for trail system development and maintenance.

### Additional Park Impacts, Mitigation and Unmitigable Impacts

Plan policies cited above are anticipated to provide adequate mitigation, and no further measures are necessary. There are anticipated to be no unmitigable significant adverse impacts related to parks as a result of implementation of the General Plan.

## 16.4 Schools

### Environmental Setting

The City of Redlands with Planning Area is served by the Redlands Unified School District (RUSD). The District also serves the cities of Loma Linda, Highland, small portions of San Bernardino and Yucaipa, as well as some unincorporated areas of San Bernardino County. The Planning Area has 9 elementary schools, 2 middle schools, 1 high school and a new high school, currently under construction, and slated to open 1997. The Redlands Unified School District currently uses population generation rates based on housing starts to estimate demand for school enrollment.

### School Impacts and Mitigation

In the period 1990-1991, the District experienced a five percent growth, in 1991-1992 another five percent growth. In 1992-1993 the District noted a two percent growth, in 1993-1994 a one percent growth and in 1994-1995 they have projected approximately one percent growth again. This lowered level of growth has been based upon the slowed economy and lower housing starts.

Implementation of the proposed Plan may create additional demands on school facilities due to potential increase in new residential structures in both the City and Planning Area. The District mitigates the impacts on school facilities from new development by the imposition of development impact fees on all construction. Additionally, to provide more space for increased enrollment, the District has started using year round classes. A number of RUSD schools within the Planning Area are currently designed to operate on a year-round basis. These include Arroyo Verde, Bryn Mawr, Franklin, Kingsbury, Lugonia, Smiley, Victoria, Cope, and Moore.

Enrollment per housing unit is based on information provided by Teri Shira, Redlands Unified School District Facilities Planning Division, April 1995, as shown in Table 16.2 below:

| | (K-6) ELEMENTARY | (7-8) SECONDARY | (9-12) HIGH SCHOOL |
|---|---|---|---|
| Single Family Detached | .3114 | .0762 | .1500 |
| Multiple Family* | .1733 | .0370 | .0710 |
| Mobile Home | .1475 | .0375 | .0691 |

* Apartments and Condominiums

Current grade configuration of K-6, 7-8, and 9-12 was implemented in 1992-1993 in preparation for the second high school, which will enable the school district to have two 9-12 high schools. Enrollment shifts or educational policy could result in a K-5, and 6-9 grouping, although no plans are in place at this time for such a change.

Nine K-6 schools with a total capacity of 7,863 (90 percent loading) serve the Planning Area, an average of 873 per site (see MEA Table 15.1). Elementary enrollment in 1993-94 was 6,476. Projected RUSD enrollment at buildout is 9,500 creating a deficit of 1,637 and requiring three additional schools. Sites shown on the General Plan Diagram are North Redlands (Judson Street site - owned), Greenspot, and San Timoteo Canyon.

All of the District's existing facilities for students in grades 7-12 are within the Planning Area. The two middle schools, Cope and Moore, (7-8) have a total capacity of 2,482 (90 percent utilization), an average of 1,241 per site (see MEA Table 15.2). Middle school enrollment in 1993-94 was 2,609. Projected enrollment at buildout is 3,546, leaving a deficit of 1,064.

Redlands High School (10-12) including the Freshman Campus (9) enrolled 4,081 students in 1993-94, which is higher than its 3,917 student capacity (90 percent utilization). At buildout, projected enrollment in grades 10-12 is 4,942, using the same service area assumption as for the middle schools, resulting in a deficit of 1,025 students. The second high school site shown on the General Plan Diagram at California Street and San Bernardino Avenue would provide additional capacity for approximately 2,500 students.

Based on the analysis above, with construction of the second high school and assuming the ability to adjust attendance boundaries appropriately, 7-12 grade schools would be slightly under capacity.

The General Plan Diagram designates sites to serve the K-6, 7-8, and 9-12 configuration, thus following current District policy, to be put into operation when the second high school opens.

Frequent review of school site needs will be essential as the choice of available sites narrows and as inevitable changes in enrollment ratios and educational policy occur.

The guiding and implementing policies within the General Plan are designed to mitigate potential impacts as identified above. These policies also seek to improve facilities and to promote better communication between the City and the School District in planning for the development of new public schools. Guiding Policy 4.91a and Implementing Policies 4.91f and 4.9g reflect this commitment to increased communication and cooperation. Guiding Policies 4.91c and 4.91d encourage design improvement and location of schools to contribute to neighborhood pride and identity. Guiding Policies 4.91b and 4.91e encourage the joint use for adjoining school/park facilities and joint use of school facilities for neighborhood recreation.

### Additional School Mitigation and Unmitigable Impacts

With the construction underway of the second high school in the eastern portion of the City, and the planned elementary school on Judson, it is anticipated that projected enrollment will be served. The General Plan Land Use Map designates general locations for two more elementary schools (Greenspot and San Timoteo Canyon). It is anticipated that no further mitigation is necessary for schools. There are anticipated to be no unmitigable significant adverse impacts related to schools as a result of the implementation of the General Plan.

## 16.5 Police

### Environmental Setting

The City of Redlands operates its own police force with 74 sworn officers and 37 full time non-sworn personnel. The Police Department provides service within the City limits of Redlands. In the Planning Area, police protection is provided by the San Bernardino County Sheriff's Department (unincorporated area) and the California Highway Patrol (CHP) along interstate and state highways. The Redlands Police Department has its central police station at 212 Brookside Avenue, operates three substations, one at 815 North Orange and one at 1381 East Citrus Avenue and one on Brookside Avenue and has a police annex at 30 Cajon Street (in the old City Hall). Currently the Department indicates that it is operating at full capacity, providing approximately one police officer and non-sworn personnel per 631 24-hour population (includes permanent residents and transients, approximately 70,000 people as estimated by Redlands Police Department).

Within the Planning Area, the County Sheriff's Department serves the Mentone, Crafton, and Mill Creek areas. The Sheriff's substation is located at 34282 Yucaipa Boulevard, Yucaipa and currently has 28 sworn officers serving the area. Eight of these officers are County Deputies and twenty serve as City of Yucaipa Deputies. The service ratio is one officer per 1,523 people within the county portion of the Planning Area.

### Police Impacts and Mitigation

Implementation of the proposed Plan may create additional demands on the police protection services due to potential increase in new commercial and residential land uses. The Police Department has established a level of police services at a minimum of 1.3 officers per thousand 24-hour population and two non-sworn support staff per sworn officer. The City of Redlands mitigates these impacts by imposition of development impact fees on all construction to fund public, including police, facilities. Additionally, property tax and sales tax revenue assist in funding of police operations. As development occurs, these funding sources increase proportionately.

The Police Department has made a significant effort at crime prevention as a mitigation against potential impacts. Community policing programs such as DARE, the use of substations, public forums, and Neighborhood Watch programs have been effective. Additional community participation in the Multiple Enforcement Team, Explorer and Chaplain programs has been utilized as a crime prevention measure.

### Additional Police Mitigation and Unmitigable Impacts

Current policies and procedures are anticipated to provide adequate mitigation and no further measures are necessary. There are anticipated to be no unmitigable significant adverse impacts related to police services as a result of implementation of the General Plan.

## 16.6 Fire

### Environmental Setting

Current fire protection to the City of Redlands is provided by the Redlands Fire Department. Unincorporated portions within the Planning Area are served by the California Department of Forestry and Fire Protection (CDFFP), as contracted by the County of San Bernardino and headed by the County Fire Warden. Adjacent National forest lands are served by the U.S. Forest Service.

Portions of the Planning Area include the high fire risk lands of San Timoteo and Live Oak Canyons, the Badlands, and the Crafton Hills. These areas have been designated as High Fire Hazard areas. Areas of wildland and urban interface, such as those located in the Planning Area, require fire prevention strategies. These include: restriction of roof types and materials, regulation of the lengths and widths of streets and cul-de-sacs, limitation of construction on slopes, and creation of greenbelts and fuel modification zones.

### Fire Impacts and Mitigation Provided by Plan Policy

Implementation of the proposed Plan will create additional demands on existing fire protection services due to the increase in new residential and commercial structures in the City. The City of Redlands mitigates these impacts by imposition of development impact fees to fund public, including fire, facilities. Property tax and sales tax revenue assist in funding of Fire Department operations. As development occurs, these funding sources increase proportionately. Additional impacts on fire services will be associated with the projects within the Planning Area's high fire hazard regions. In response to this risk, the Plan has Guiding and Implementing policies to help prevent fires and reduce the potential for loss of lives, property and natural resources.

The policies within Section 8.30, Drainage and Flooding, of the General Plan are designed to mitigate the potential impacts identified above. Guiding Policy 8.30a requires the City to work to prevent wildland and urban fires and to protect the citizenry from fire dangers. Implementing Policy 8.30b encourages adherence to the requirements for high fire hazard areas designated by the Redlands Fire Department on the official Roof Classification Zone Map, and as specified by the Department's document describing High Fire Hazard Area Fire Safety Modification Zone (5/1995). Policy 8.30c requires the monitoring of fire-flow capacity throughout the Planning Area and the improvement of inadequate flows for fire protection. Policy 8.30d requires the monitoring of methane gas production at active and inactive landfills. A landfill gas control system was installed at the California landfill site in accordance with the requirements of the South Coast Air Quality Management District in 1993, and has been operated within the regulatory requirements since. Policy 8.30e encourages alternative fire protection standards in Rural Living areas. Policy 8.30f specifies that development in the foothill areas adopt implementation measures from the 1983 Foothill Communities Protective Greenbelt Program (FCPGP). The FCPGP has subsequently been developed into the San Bernardino County "Greenbelt" Fire Safety Overlay Ordinance (July 1989 Development Code).

The Redland's Fire Department Prevention Standard is based upon the County's FR1 and FR2 specifications in this ordinance. This Policy 8.30g requires all projects within high fire hazard areas adhere to the Redlands Fire Department Prevention Standard "Fire Safety Modification, Zones 1 and 2" (May 1995).

### Additional Fire Mitigation and Unmitigable Impacts

There are anticipated to be no unmitigable significant adverse impacts related to fire hazards as a result of implementation of the General Plan. Fire hazard mitigation measures for specific sites or subareas within the Planning Area may be designed as project details become available. Examples of project-specific measures include those in the Redlands Southeast General Plan Amendment FEIR, October 1987, and the Hidden River Country Club Estates DEIR, 1995.

## 16.7 Emergency Management

### Environmental Setting

The potential for major disasters and natural hazards increases with intensified urbanization in previously unpopulated areas and with the development of industries utilizing hazardous materials. In the event of an emergency in the Planning Area, the City of Redlands will utilize the *Emergency Disaster Plan* to provide strategies for emergency response. Plan Policies within General Plan Section 8.90 identify the *City of Redlands Emergency Disaster Plan* as the guide for post-hazard mitigation and require that the Plan be revised every two years to reflect Planning Area changes.

The *Emergency Disaster Plan* identifies several hazardous situations to which the City will respond. Of these, earthquake, flood, dam failure and fire are addressed in other sections, and their impacts are intended to be minimized through implementation of General Plan policies. (See Section 8.0 of the General Plan.) Additional disasters covered by the *Emergency Disaster Plan* include war, terrorist acts, transportation accidents, industrial accidents, civil disturbances, storms, pollution, epidemics, hazardous or radiological spills, major gas line ruptures, draught and extreme heat.

The Federal Emergency Management Agency (FEMA) has renewed emphasis on reducing the potential for future disaster losses through the implementation of the City's post-hazard mitigation plan is based upon Federal requirements of stat and local governments to evaluate and mitigate natural hazards as a condition of receiving federal disaster assistance. Section 409 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 (Public Law 93-288, as amended) is the basis for this Federal requirements.

#### Emergency Management Impacts and Mitigation

Implementation of the General Plan will add approximately 35,000 people to the Planning Area at General Plan buildout. All of these people will be subject to the area's hazards and disasters and will need protection and services in the event of an emergency.

The policies within Emergency management section of the General Plan are designed to mitigate the potential impacts of the hazardous situations identified previously. Guiding Policy 8.90a requires the use of the *City of Redlands Emergency Disaster Plan* as the guide for post-disaster mitigation planning in the Redlands Planning Area. Guiding Policy 8.90b encourages City level self-sufficiency in emergency response. Implementing Policy 8.90c requires continual updating of the *Emergency Disaster Plan* to reflect changes in the Planning Area. Implementing Policy 8.90d encourages establishment of community programs to train volunteers to assist professionals during and after disasters. Implementing Policy 8.90e requires planning for long-term recovery from disasters and multi-agency and interagency coordination.

### Additional Emergency Management Impacts, Mitigation and Unmitigable Impacts

No unmitigable significant adverse impacts related to emergency management are anticipated as a result of implementation of the General Plan.

## 16.8 Waste Management

### Waste Management and Recycling Impacts and Mitigation Provided by Plan Policy

The Plan proposes an estimated increase of approximately 34,000 people over the next at buildout, anticipated to result in a net increase in the area's solid waste generation. Plan policies specified in GP Section 7.24, Waste Management and Recycling, express a commitment to reduction in per capita solid waste generation and an increase in recycling of materials, to be achieved through implementation programs under the general guidance of the City's Source Reduction and Recycling Element (SRRE) and the Household Hazardous Waste Element (HHWE).

The Plan's commitment to per capita reduction of solid waste cannot solve the larger, regional problem: the lack of appropriate remaining landfill space within reasonable haul distance. This pervasive problem led to the passage of Assembly Bill 939, the California Integrated Waste Management Act of 1989. The Redlands General Plan commits to compliance with the requirements of the Act and its amendments. Any specific projects or facilities to be implemented in compliance with AB 939 are required to be processed through CEQA. Additionally, the regulatory changes to AB 939 affect the applicability of the City's current SRRE and HHWE. As a result of these changes, annual status reports of implementation programs and performance are required by the California Integrated Waste Management Board (CIWMB). Short term (1995) regulatory diversion goals remain at 25%; but the feasibility of a 50% diversion goal by the year 2000 is under consideration by the state. However, implementation measures in the SRRE are projected to result in a remaining permitted disposal capacity, by the end of 2005, of 3,081,483 cubic yards. Without the measures specified in the SRRE, 2,722,749 cubic yards of permitted disposal capacity are projected to remain within the Planning Area.[1]

Guiding and implementing policies within the General Plan are designed to mitigate potential impacts identified above. Guiding Policy 7.24a requires that the generation of solid and hazardous waste be reduced and that the recycling of materials be increased to slow the filling of the California Street landfill and the County's Solid Waste Disposal Facility in San Timoteo Canyon.

Implementation Policy 7.24b describes the combined document of the SRRE and the HHWE which was prepared in response to AB 939 and was approved by the CIWMB in January, 1995. Implementation Policy 7.24c requires that the City meet the state short term mandatory diversion goals and proposes reducing the landfill disposal of household hazardous waste as much as feasibly possible. Implementation Policy 7.24d examines possible expansion of the California Street landfill and alternatives for reuse after near-term closure in 1998.

### Additional Waste Management Mitigation and Unmitigable Impacts

Plan policies cited above are anticipated to provide adequate mitigation, and no further measures are necessary. There are anticipated to be no unmitigable significant adverse impacts related to solid waste management and recycling as a result of implementation of the General Plan.

[1] City of Redlands, *Source Reduction and Recycling Element,* 1994, pp. 8-6, 8-7.

# 17.0 ENERGY

Redlands General Plan / EIR

## 17.0 ENERGY

**Setting.** Electrical energy is provided by the Southern California Edison Company, and natural gas is delivered by the Southern California Gas Company. Service is adequate for current energy consumption. Project-specific energy conservation measures have been incorporated in past projects within the Planning Area, although there is no energy conservation program, per se, in effect today.

For a full discussion of existing conditions, refer to MEA Section 16.0, Energy. This section includes information on existing energy supplies and resources. In addition, this section also contains references to energy related studies, documents and plans from other development projects in the Planning Area.

### Energy Impacts and Mitigation Provided by Plan Policy

Impacts on electricity and natural gas resources are considered significant if there is a substantial increase in demand upon existing sources of energy, or if the project requires the development of new sources of energy (CEQA Guidelines Appendix G).

Development occurring in accordance with proposed land use policy will require substantial amounts of energy for the manufacturing of building materials and construction of structures and public improvements. The energy requirements for construction, although substantial, will last only as long as construction continues. Construction impacts on energy are considered less than significant.

New development is anticipated to result in increased electrical and natural gas demand and will require additional supplies compared to existing conditions.

Natural gas and electrical demand for commercial, industrial and residential buildings will vary depending on the type of energy systems incorporated into the building design and the degree of its usage as a primary energy source. EIR Tables 17.1 and 17.2 below provide an estimate of energy consumption in the Planning Area at buildout. The demand factors identified in the following tables assume reliance on natural gas and electricity as the primary source of heating for new development.

EIR Table 17.1
Electricity Consumption at Buildout

| Use | Units/Sq.Ft. | Usage Rate | Kwh/yr Total |
|---|---|---|---|
| Residential | 36,414 | 5,626.5 kwh/unit/yr | 204,883,372 |
| Commercial | 8,646 ksf | 13.55 kwh/sf/yr | 117,153,300 |
| Office | 10,048 ksf | 12.95 kwh/sf/yr | 130,121,600 |
| Industrial | 21,642 ksf | 10.5 kwh/sf/yr | 227,241,000 |
| TOTAL | | | 679,399,272 |

EIR Table 17.2
Natural Gas Consumption at Buildout

| Use | Units/ Square Feet | Usage Rate | Usage (c.f./mo) | Total Usage (c.f./yr) |
|---|---|---|---|---|
| Residential | | | | |
| Single-Family | 23,593 units | 6,665 c.f./unit/mo | 157,247,345 | 1,886,968,140 |
| Multi-Family | 12,821 units | 4,012 c.f./unit/mo | 51,437,852 | 617,254,224 |
| Office | 10,048 ksf | 2.0 c.f./s.f./mo | 20,096,000 | 241,152,000 |
| Commercial | 8,646 ksf | 2.9 c.f./s.f./mo | 25,073,400 | 300,880,800 |
| Industrial | 21,642 ksf | 3.3 c.f./s.f./mo | 71,418,600 | 857,023,200 |
| TOTAL | | | 3,903,278,364 | |

Although the increase of energy resources appears substantial relative to current consumption, the amount of increase will not substantially impact existing resources. Southern California Gas Company representatives have indicated that the City of Redlands can continue to be serviced from facilities within the area. This service would be in accordance with the company's policies and extension rules on file with the California Public Utilities Commission at the time contractual agreements are made.

Southern California Edison (SCE) expects to meet its electrical demand requirements for the next several years. This is correct provided the demand for electrical generating capacity does not exceed SCE's current (1995) estimates, and no substations or power lines are damaged (such as in a rain storm or fire). Because SCE is a franchised utility, failure to serve any new development would result in revocation of the franchise; therefore, SCE has indicated it will expand capacity to serve new development.

It is anticipated that implementation of the General Plan will not require the development of new sources of energy and energy resource impacts do not appear to be significant. However, the impact of buildout under the proposed General Plan (or any scenario except a complete cessation of growth) will be an increase in the consumption of non-renewable energy resources. The following policies in the Energy Resources and Conservation Section (7.23) of the Open Space and Conservation Element of the General Plan address the impacts to Energy Resources.

Policies 7.23a, 7.23b, 7.23c and 7.23f identify conservation of scarce or non-renewable energy resources, support of San Bernardino County's energy-related policies and energy efficiency through architectural design as necessary in the future. In addition, policies in the proposed General Plan address energy impacts in two ways: First by requiring the application of energy-conserving measures and second by encouraging the investigation and use of alternative sources of energy (especially renewable sources).

General Plan policies in Section 7.23 , the Energy Resources and Conservation Section of the Open Space and Conservation Element, stress the value of conservation of scarce or nonrenewable energy resources, support the County in implementation of their energy-related policies, and require consideration of energy efficiency in architectural design. The Plan advocates coordination with Southern California Edison Company and Southern California Gas Company to educate the public about the need for energy conservation. The City's recycling program is anticipated to aid in the reduction of energy use related to the Planning Area.

Policy 7.23g in the Energy Resources and Conservation Section of the Open Space and Conservation Element of the General Plan addresses the implementation and enforcement of Title 24 (California Administrative Code) building standards in new or substantially remodeled construction. Title 24 provides the detailed unambiguous standards necessary to ensure that significant energy conservation is achieved in new construction. In addition, Policy 7.23h encourages the exploration of alternative sources of energy.

General Plan policies in Section 5.0 , the Circulation Element, commit the City to Transportation Systems Management (TSM) which, when implemented, is expected to minimize trips and vehicle miles travelled, thus minimizing impacts to energy consumption attributable to transportation.

Despite the possibility that implementation of energy conservation measures may decrease per capita energy consumption, total energy use within the Planning Area is anticipated to increase as a result of Plan implementation.[1]

Although plan policies cited above are anticipated to conserve energy to the maximum extent feasible, more stringent measures would involve curtailment of all development, which is not considered socially, politically, or economically acceptable or feasible.

**Additional Energy Mitigation and Unmitigable Impacts**

Despite the application of conservation measures cited above, energy consumption related to buildout of the General Plan (electricity and natural gas) will result in significant unavoidable adverse impacts on non-renewable fuel sources.

[1] *East Valley Corridor Specific Plan FEIR*, October 1988, p. 168.

# 18.0 ELECTROMAGNETIC FIELDS

Redlands General Plan / EIR

## 18.0 ELECTROMAGNETIC FIELDS

**Setting.** Although electrical transmission lines criss-cross the City, the highest voltage lines 220 kilovolts that are under study as potential health hazards, only traverse the western edge and cross the southwestern corner of the Planning Area. Most of these lines are remote from existing housing.

### Electromagnetic Fields Impacts and Mitigation Provided by Plan Policy

Development under the Plan is not anticipated to place residential development or other sensitive uses in proximity to the existing high voltage (220 kilovolt) transmission lines which traverse the southwest corner of the Planning Area. The major issue and potential impact of significance associated with electromagnetic fields is one of health. To date the potential health hazard is only associated with the electromagnetic fields in relation to 220 kilovolt transmission lines or greater. These lines are currently (1995) only located in remote low density areas. Therefore, existing impacts associated with the potential electromagnetic field hazards are minimal. In addition plan policies within GP Section 8.70, Electromagnetic Fields, specify supporting research into the health effects of electromagnetic fields generated by power transmission lines and other sources, and taking appropriate action, if warranted, to reduce hazardous exposure of residents.

Within the MEA discussion of Energy Section 16.0, the general location of existing (1995), 220 kilovolt transmission lines is described.

### Additional Mitigation and Unmitigable Impacts

Plan policies cited above are anticipated to provide adequate mitigation, and no further measures are necessary. There are anticipated to be no unmitigable significant adverse impacts related to electromagnetic fields as a result of implementation of the General Plan.

### Significant Unavoidable Adverse Impacts of the Project

Based on the information presented above and in MEA Section 17.0, Electromagnetic Fields, no significant unavoidable adverse impacts are anticipated.

# 19.0 ALTERNATIVES

Redlands General Plan / EIR

# 19.0 ALTERNATIVES TO THE PROPOSED PROJECT

This evaluation of alternatives to the proposed General Plan Update is presented taking into account both General Plan policy and quantitative impacts by environmental issue for each alternative. Following the narrative, the various development alternatives considered are presented in a comparative matrix.

This section will not address the issue of alternative locations for the proposed Redlands General Plan Update. CEQA requires an evaluation of alternative locations only when it is deemed reasonable and could feasibly attain the basic objectives of the proposed project. In this case, the basic objective is to establish a desired land use pattern for the City of Redlands and its environs. The City of Redlands can't reasonably acquire or control an alternate location, and the basic objective outlined above cannot be feasibly attained for this project at any other location. Therefore, an alternate location alternative is rejected as infeasible.

## 19.1 Description of Alternatives

Alternative 1: The Proposed Project (Proposed General Plan)
Alternative 2: No Project (Existing General Plans)
Alternative 3: No Development (Existing Land Use Conditions Only)
Alternative 4: Reduced Development (25% Reduction of Density/Intensity Across Entire Planning Area)
Alternative 5: Reduced Traffic (Employment and Retail/Residential balance)

Table 19.1 below, Statistical Comparison of Alternatives, lists the number of residential dwelling units, commercial, office and industrial square feet, and total projected population at buildout under each alternative. The numbers shown are totals for the project area at buildout (i.e., existing plus new).

**Table 19.1**
**Statistical Comparison of Alternatives**

| Alternative | Dwelling Units | Commercial | Office (thousand Square Feet) | Industrial | Population |
|---|---|---|---|---|---|
| Alt. 1 | 36,414 | 8,646 | 10,048 | 21,642 | 101,644 |
| Alt. 2 | 38,221 | 8,925 | 8,397 | 29,475 | 106,688 |
| Alt. 3 | 26,906 | 3,099 | 2,437 | 3,287 | 66,301 |
| Alt. 4 | 27,311 | 6,485 | 7,536 | 16,231 | 76,235 |
| Alt. 5 | 38,814 | 5,496 | 7,049 | 14,991 | 108,344 |

### 19.1.1 Alternative #1: Proposed Project

This is the proposed project (i.e., buildout of all portions of the project area under the proposed City General Plan). Development under the proposed project would result in 36,414 residential units, 8,646,000 square feet commercial, 10,048,000 square feet of office, and 21,642,000 square feet of industrial uses. The projected buildout population under the proposed project is 101,644. In comparison with existing (1995) conditions, the project represents an increase in dwelling units of 35%, and an increase in commercial, industrial, and office square footage of 357% over existing conditions.

If the proposed plan were to be implemented, the environmental impacts described in the previous sections of this report would occur. However, many of those impacts have largely been mitigated to levels of insignificance through implementation of General Plan policies.

### 19.1.2 Alternative #2: Existing General Plans

This alternative assumes buildout of the Redlands Planning Area under the existing City of Redlands General Plan adopted in 1972 and modified by the Southeast Area Plan (1987) and The East Valley Corridor Specific Plan (1989). It also assumes buildout under the San Bernardino County General Plan (adopted in 1989 revised 1993) for all unincorporated portions of the Planning Area. The purpose of this alternative is to show buildout under the current General Plan as a comparison with the proposed project. Development under this alternative would result in a total of 38,221 residential units, 8,924,780 square feet of commercial uses, 8,397,140 square feet of office, and 29,474,520 square feet of industrial uses within the project area at buildout. In comparison with existing (1995) conditions, this alternative represents an increase in dwelling units of 42%, and an increase in commercial, industrial, and office square footage of 430% over existing conditions. This alternative ranks second highest out of the five alternatives in residential units and non-residential building square feet, and higher than the proposed project in both.

### 19.1.3 Alternative #3 No Project/No Development (1995 Conditions)

This alternative assumes no further development in the project area above 1995 conditions and provides a baseline for environmental analysis. Existing residential units and non-residential structural square feet are 26,906 and 8,824,690, respectively. This alternative ranks lowest of five in residential units and building square footage, and lower than the proposed project in both. Under the "no project" alternative, developed existing land uses in the City would remain. No further development would occur on existing privately-owned land (vacant lots or open) and no intensification of existing uses would be permitted.

This alternative represents an environmentally superior alternative when compared to any of the development scenarios. None of the impacts of development described in the previous sections of this Draft EIR with regard to the proposed project would occur. Impacts on visual resources, biological and archaeological/historic resources, energy, hydrology, wastewater and solid waste generation, traffic, air and noise conditions would remain constant. However, cumulative project activities from beyond the planning area would continue to impact all of the categories listed above as well as increased demand on City services and facilities such as schools, libraries and parks. This alternative would also likely result in additional pressure for development to occur in surrounding areas, thus increasing impacts in these areas and to the project area.

Adoption of the "no project" alternative is the environmentally preferred alternative. However, adoption of this alternative would prevent the City of Redlands in achieving its goals and objectives in its existing and proposed general plans. It would also violate State law which requires each city and county to prepare and adopt a comprehensive general plan for long term development of the jurisdiction.

Recent revisions to the CEQA Guidelines (Section 15126 (d)(4)) state that the "no-project" alternative should look at existing conditions as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and available services. Should the project not be approved, the planning area would be built out under existing general plans. This scenario is discussed in Alternative #2, above.

### 19.1.4 Alternative #4: Reduced Development

This alternative reduces density of potential new development, as proposed under Alternative #1 throughout the project area by 25% (i.e., the whole project area under proposed City General Plan), and is intended to provide an alternative which will reduce project impacts related to most environmental issues. Adoption of this alternative would result in a reduction of significant impacts not mitigated by the General Plan. These issues are discussed in Section 1.3 of the EIR and include loss of Prime Agricultural land; unacceptable traffic Levels of Service; significant noise increases; loss of Open Space and habitat; and potential impacts on sensitive species. Development under this alternative would result in 27,311 residential units and 30,252,000 non-residential structural square feet within the project area at buildout. The number of residential units and non-residential building square feet at buildout of this alternative represent an increase of 1.5% and 242%, respectively, over existing conditions. This alternative ranks second lowest out of five alternatives in residential units and non-

residential structural square feet square feet, and lower than the proposed project in both.

### 19.1.5 Alternative #5: Reduced Traffic

Although the proposed project applies policies designed to ensure that minimum roadway levels of service (LOS) are not exceeded, this alternative provides a second approach to the issue of traffic through adjusting land use on the General Plan Diagram. LOS deficiencies and resultant roadway improvement requirements are largely a result of the high rates of retail and employment growth projected at buildout in the East Valley Corridor as compared with the more moderate growth in residential uses throughout the Planning Area. To achieve a closer local balance between housing and employment/shopping opportunities (and thus a reduction in traffic and elimination of most LOS deficiencies), this scenario assumes a 69 percent reduction in retail square footage and a 37 percent reduction in office and industrial square footage from the proposed General Plan. The land area resulting from this reduction is assumed to support about 2,400 housing units assuming a density of 2.7 dwelling units per acre in the East Valley Corridor. This alternative ranks highest in number of dwelling units and second lowest in total non-residential building square footage. It also ranks highest in total population.

## 19.2 Conclusion and Comparison of Alternatives Matrix

Strictly from an environmental standpoint, Alternative #3, No-Project/No-Development, is the preferred alternative. No impacts identified with the project or with any of the other alternatives would occur. However, this alternative would prevent the City from meeting any of its goals in the existing and proposed General Plans. Prohibiting development within the City could also increase development pressures in surrounding areas, thereby increasing potential impacts in these areas. Since it would also violate State law which requires each city and county to prepare a General Plan, Alternative #3 is rejected as the preferred alternative.

Alternative #4, Reduced Development, is selected as the environmentally preferred alternative, having the fewest overall impacts. This alternative would result in less conversion of open space, preservation of more agriculture, less surface runoff, reduction in biological impacts, reduced visual impacts, and lower consumption of energy and reduced demand for all public services. The exception to improvements under this alternative is traffic, which would be reduced by 18% under Alternative #5 compared with 13% for Alternative #4. Alternative #5 would also result in a slight reduction in noise and air quality impacts. For these reasons, the Reduced Traffic Alternative is ranked second as the preferred alternative. However, Alternative #4 remains the environmentally preferred alternative due to reduction in population and the associated need for fewer community services and energy. It would also increase the amount of land that would remain in natural open space and agriculture.

Alternative #2, Existing General Plans was not identified as environmentally superior in any of the topics analyzed due to its rank as highest in non-residential building square footage and second highest in number of dwelling units and population. Alternative #1, the proposed General Plan is identified as preferred over existing General Plans due to a reduction in hillside residential densities, reduced development in flood zones and a significant reduction in overall non-residential building square footage.

The following matrix (Table 19.2) summarizes each of the five alternatives and their potential impacts for each category discussed in this EIR. Each alternative is discussed in terms of impacts compared with the proposed project and these potential impacts are quantified where possible .

**Table 19.2**
**Comparison of Alternatives**

| Topic | Alternative #1 Proposed Project | Alternative #2 Existing General Plans | Alternative #3 No Development | Alternative #4 Reduced Development | Alternative #5 Reduced Traffic |
|---|---|---|---|---|---|
| **Land Use** | The project will result in a total of 36,414 dwelling units and approximately 40,000,000 square feet of non-residential building square feet. The General Plan Diagram establishes the land use pattern throughout the planning area and is intended to promote orderly development and to minimize land use conflicts. General Plan policies are anticipated to provide adequate mitigation to potential land use impacts. | Would result in a slight increase in environmental impacts as compared with the project. Buildout under existing General Plans would generate 38,221 dwelling units and 46,797,000 square foot of non-residential structures. Existing plans allow for several large, higher density PUD's while generally reducing density in most agricultural areas in the eastern portion of the Planning Area and accommodating more industrial uses in the north-central portion of the Planning Area. The project reduces hillside residential density and development in flood zones. Therefore, the project is slightly superior to this alternative in terms of land use and compatibility. | Land use impacts under this alternative would be considerably less than any of the other development scenarios in that all construction would be halted at 1995 conditions with a total of 26,906 dwelling units and 8,800,000 square feet of non-residential development. | Would have similar land use impacts as the project but would reduce densities across the entire Planning Area and will therefore reduce impacts related to most environmental issues. Development under this scenario would result in 27,311 residential units and 30,252,00 non-residential building square footage. | Reduces the amount of non-residential building square footage by less than half of what is proposed for the project to a total of 18,711,000 square feet primarily in the East Valley Corridor. Applies the vacated land acreage to residential, increasing the number of single family residences by 2,400 units. |

| Topic | Alternative #1 Proposed Project | Alternative #2 Existing General Plans | Alternative #3 No Development | Alternative #4 Reduced Development | Alternative #5 Reduced Traffic |
|---|---|---|---|---|---|
| **Open Space** | Development under the proposed project would result in the conversion of about 9,000 acres of open space to urban uses. | Similar to project in number of acres of Open Space converted to urban uses since the East Valley Corridor Specific Plan remain constant under both alternatives. The major differences are that this scenario would result in the unincorporated eastern portion of the Planning Area being built out at slightly lower residential densities overall (with the exception of a large residential PUD) and the north-central portion being designated as industrial rather than flood control. | Since no further development takes place under this alternative, all remaining open space and vacant land would remain undeveloped. Therefore, the 9,000 acres that are to be converted to urban uses under the proposed plan would continue as agriculture, open space and vacant land. | Similar to project but would result in the conversion of about 6,700 acres of open space to urban uses, thus preserving an additional 2,300 acres of agriculture, open space and other vacant land. | No change from project in that no additional open space would be preserved under this scenario. |
| **Geotechnical** | Proposed development of the project area will result in potential exposure of additional persons and property to seismic and geotechnical constraints. General Plan policies will mitigate most of these hazards with the exception of unanticipated seismic hazards. | Similar to the project, but would expose more people and structures to geotechnic hazards due to slightly higher population and building square footage. | Would not expose any additional persons or property to potential geotechnic hazards. However, existing development and population are subject to seismic activity. | Similar to project, but fewer persons and property exposed to geotechnic hazards due to decrease in overall development. | Would expose additional population to seismic activity with the increase in dwelling units associated with this alternative. |

| Topic | Alternative #1 Proposed Project | Alternative #2 Existing General Plans | Alternative #3 No Development | Alternative #4 Reduced Development | Alternative #5 Reduced Traffic |
|---|---|---|---|---|---|
| **Agricultural** | The project will result in conversion of about 4,700 acres of agriculture to urban land uses. | Both the existing and proposed General Plans designate conversion of agriculture to urban uses under the East Valley Corridor Specific Plan and throughout the Planning Area. However, the existing General Plan does not identify specific areas for agricultural preservation, while the proposed project will preserve over 600 acres of agriculture. | Under this scenario, all land which is presently under agricultural cultivation would remain. This would preserve approximately 5,800 acres of existing citrus and other agriculture that would be converted to urban uses under the proposed plan. | Since all development would be reduced throughout the Planning Area, it is assumed that conversion of agriculture would also be proportionately reduced as well under this scenario. This alternative has the potential to preserve about 780 acres of agriculture which is about 160 acres more than that retained by the project. | This alternative would decrease nonresidential acreage but increase residential acreage accordingly. Consequently, the conversion of agriculture to urban uses would not change in comparison with the project. |
| **Hydrology** | The project will result in increased runoff due to additional impervious surfaces which could subject some areas to increased flooding. The increase in urban runoff also has the potential to degrade water quality. Total water consumption at project buildout would be about 30.3 million GPD. | Will increase runoff more than project due to higher densities under existing plans. This increase in runoff may expose more development to flooding and could result in slightly higher water quality impacts. Consumption at buildout of this alternative would be slightly higher at a rate of about 32 million GPD. | Will not result in any additional flood hazards and water quality would not be expected to significantly decline from present levels. Water consumption would remain fairly constant at the current estimated consumption rate of 19.9 million GPD. | Surface runoff would increase under this alternative but not as much as the project. Water quality would be expected to improve somewhat under this scenario due to lesser amounts of urban runoff. Water consumption would be lower than the project at the rate of about 22.8 million GPD. | The amount of land converted to urban uses would not change in comparison with the project. Therefore, urban runoff and water quality are not anticipated to change substantially from the project. Due to increased residential land uses, water consumption would be the highest of all alternatives at about 32.5 million GPD. |

| Topic | Alternative #1<br>Proposed Project | Alternative #2<br>Existing General Plans | Alternative #3<br>No Development | Alternative #4<br>Reduced Development | Alternative #5<br>Reduced Traffic |
|---|---|---|---|---|---|
| **Biotic Resources** | Implementation of the proposed General Plan will reduce the amount of habitat available to wildlife due to conversion of agriculture and other open space to urban uses. Three plants and three animals known to exist in the Planning Area are listed as rare, threatened or endangered by the State or Federal Government. Policies in the General Plan serve to reduce or avoid significant impacts to sensitive species. However, the loss of habitat due to project implementation will contribute to an unmitigable regional loss of habitat. | Under existing General Plans, structural square footage has the potential to increase by about six million square feet over the proposed plan and population could increase by about 5,000 persons. This would result in a greater degree of habitat loss due to direct conversion of land to urban uses and could indirectly degrade habitat to a greater degree due to the effects of higher population. | No further loss of significant biological habitat would occur under this scenario. While human encroachment would continue to affect habitat, this alternative would not permit conversion of open space to urban uses and would not result in any significant adverse impacts on biological resources. | Would result in similar impacts upon biological resources as the project. However, impacts would be slightly reduced in comparison to the project due to a reduction in development and a lower population at buildout. | Similar to project in that there will be no change in amount of land converted to urban uses. However, higher levels of population associated with this alternative have the potential to increase impacts on biotic resources over those of the project. |
| **Mineral Resources** | The proposed General Plan preserves the majority of lands designated as having significant mineral resources within the Planning Area and meets the Planning Area's contribution to regional needs. | Similar to the project in that the majority of regionally significant mineral resources would be preserved under flood control conservation. This scenario would preserve slightly less mineral resources due to a higher amount of proposed industrial uses within mineral resource zones. | The no development alternative would effectively preserve all of the regionally significant mineral resource lands within the Planning Area for mineral extraction. | No significant difference from the project in that the majority of mineral resource zones would remain undeveloped under this scenario. The flood control / construction aggregate designation would stay essentially the same as the project. | Would not differ from the project in the amount of mineral resources which would be preserved. |

| Topic | Alternative #1 Proposed Project | Alternative #2 Existing General Plans | Alternative #3 No Development | Alternative #4 Reduced Development | Alternative #5 Reduced Traffic |
|---|---|---|---|---|---|
| **Air Quality** | The project area at buildout is estimated to generate 56.4 tons/day of CO; 11.9 tons/day NOx; 1.0 tons/day SOx; and 1.9 tons/day PM10. Project related growth is consistent with the 1994 AQMP and air quality control measures from the AQMP are incorportated into the General Plan. | Existing General Plans would generate an estimated 59.9 tons/day of CO; 12.7 tons/day of NOx; 1.1 tons/day of SOx; and 2.0 tons/day of PM10. Existing City General Plan does not contain extensive AQMP measures. | Would generate an estimated 26.1 tons/day of CO; 5.4 tons/day of NOx; 0.5 tons/day of SOx; and 0.9 tons/day of PM10. | Would generate an estimated 49.0 tons/day of CO; 10.1 tons/day of NOx; 0.9 tons/day of SOx; and 1.7 tons/day of PM10. | Would generate an estimated 46.4 tons/day of CO; 9.8 tons/day of NOx; 0.9 tons/day of SOx; and 1.6 tons/day of PM10. |
| **Cultural Resources** | Approval of the General Plan will encourage development within the Planning Area which could potentially have an adverse impact on areas which have not been surveyed for cultural resources. Policies in the General Plan encourage preservation of known resources and discovery of any artifacts during the course of development. Policies also serve to identify, maintain, protect and enhance the City's cultural, historic, and architectural resources. | Similar to the project in that development could potentially occur in areas containing cultural resources. Policies in existing General Plans would serve to mitigate impacts on cultural resources. | This scenario would not result in any significant adverse impacts on cultural resources since no further development would occur in sensitive areas. All historic and architectural resources would be preserved. | Similar impacts to project but reduction in density may reduce potential adverse impacts on cultural, historical and architectural resources. | Would not differ from the project in the amount of vacant land converted to urban uses. Therefore, potential impacts on cultural resources would be similar to the project. |

| Topic | Alternative #1 Proposed Project | Alternative #2 Existing General Plans | Alternative #3 No Development | Alternative #4 Reduced Development | Alternative #5 Reduced Traffic |
|---|---|---|---|---|---|
| **Visual Resources** | The primary visual impact of the project would be an increase in urban growth and a reduction in agriculture and natural open space. The General Plan contains policies for City design and scenic preservation to address this potential impact and reduce it to a level of insignificance. | Although a development pattern similar to the project would take place under existing plans, there would be higher residential densities as well as more intense non-residential development. Therefore, this alternative would have greater impacts on visual resources than the project. | No further development would occur and all agriculture and natural open space would be preserved under this plan. Therefore, from the standpoint of preserving visual resources, this alternative is superior to the project. | Same development pattern as project, but reduced densities would decrease impacts on visual resources. | Similar to project in amount of land converted to urban uses. However, replacement of some commercial uses with single family dwelling units may be percieved as having less of a visual impact. |
| **Traffic** | The project will generate an estimated 1.01 million ADT. Traffic level of service would be E or F on nine street segments and on portions of I-10 and SR-30. | Would generate an estimated 1.07 million ADT, a 6% increase over project. Would require additional roadway improvements to meet level of service policy as compared with the project. | Would continue to generate .47 million ADT. Minor street improvements would be required only to resolve existing safety and capacity problems. | Would generate approximately .87 million ADT, 13% less traffic than project. Fewer road sections which don't meet level of service standards. Would not eliminate all roadway deficiencies. | Would generate about .83 million ADT, an 18% reduction from the project. Traffic problems on or adjacent to regional routes (primarily in EVCSP area adjacent to I-10) would be significantly reduced by providing a greater balance between jobs and housing. |
| **Airport Safety** | Noise impacts from the proposed San Bernardino International Airport have not been fully identified but adverse impacts on the Planning Area are not anticipated. Safety and noise impacts on the Planning Area due to the Redlands Municipal Airport are also determined to be insignificant. | Airport safety impacts related to this plan would be similar to the project in that no significant impacts on the Planning Area due to airport facilities are anticipated. | Similar to project but would substantially lower the exposure of persons and property to potential aircraft safety impacts and exposure to noise. | Similar to project but would slightly reduce exposure of persons and property to aircraft safety impacts and exposure to noise. | Similar to project but would increase the number of persons potentially exposed to aircraft noise and safety impacts. |

| Topic | Alternative #1<br>Proposed Project | Alternative #2<br>Existing General Plans | Alternative #3<br>No Development | Alternative #4<br>Reduced Development | Alternative #5<br>Reduced Traffic |
|---|---|---|---|---|---|
| **Noise** | Buildout of the General Plan will result in significant noise increases (4.0 dBA or more) at 28 of the 64 arterial streets which were analyzed. | Traffic is projected to increase approximately 6% under existing General Plans. This will result in significant noise increases at the same locations as the project. No additional noise increases above project levels are likely to occur. | Noise exposure resulting from motor vehicles would remain at present conditions and no significant increases would occur. | Traffic under this scenario would be reduced by approximately 13% throughout the Planning Area. This could potentially decrease noise levels at some locations, but significant increases would still occur. | Would reduce traffic in the northwest area of the EVCSP by about 16% which could lower noise levels. However, reduced traffic could increase average speeds leading to potential noise level increases. |
| **COMMUNITY SERVICES**<br><br>**Sewer** | Current wastewater flows average approximately 6 million gallons per day (mgd) with a wastewater treatment capacity of approximately 9 mgd. It is projected that by the year 2028, the City of Redlands will have a total wastewater flow of approximately 7.5 mgd (1.5 mgd increase over 33 years between 1995 and 2028). Future wastewater treatment capacity is expected to be sufficient. In the event the City requires additional capacity, approximately 1.5 mgd remain to reach capacity of 9 mgd. This could accommodate additional sewage treatment for approximately another 33 years to the year 2061. | Slight increase over project in wastewater generation of approximately 8.6 million gpd. Treatment capacity would be adequate. | Current sewage generation of 6 million gpd would remain and no additional treatment capacity would be necessary. | Would create considerably lower sewage demand than the project at about 6.2 million gpd. | Higher sewage demand than the project at about 8.8 million gpd. However treatment capacity would be available. |

| Topic | Alternative #1<br>Proposed Project | Alternative #2<br>Existing General Plans | Alternative #3<br>No Development | Alternative #4<br>Reduced Development | Alternative #5<br>Reduced Traffic |
|---|---|---|---|---|---|
| **Parks** | The project will create additional demands on the City's parks and recreational services. However, General Plan policies serve to encourage preserving the park system and development of new parks. Would meet City's park standard of 5 to 6 acres per 1,000 residents. | With the second highest population estimate, this alternative would create greater demands on park services than the project. Existing General Plan policies do not adequately address the provision of parks and recreational facilities. | All existing park facilities within the Planning Area would remain and no additional parks would be added. Parkland currently meets the City's standard of 5 to 6 acres per 1,000 residents. | Would reduce demands on the park system due to lower population and employment projections. Therefore, less parkland would need to be developed. | With the highest population estimates, this would create more demand on park services than the project. However, this is somewhat offset by the substantial decrease in employment. |
| **Schools** | Total enrollment at buildout is projected to be 17,988 students, creating a deficit of 3,726 and requiring additional new schools. Policies in the General Plan will mitigate this enrollment deficit. | Under existing General Plans, total enrollment would increase by about 545 students over the proposed project. New facilities would be required. | Would remain at present enrollment levels, which is about 4,800 fewer students than under the proposed General Plan. New facilities would not be required under this alternative. | Would result in an enrollment level of about 13,491 students, which is about 4,500 fewer students than the project. Since this is only 300 additional students over existing enrollment, new facilities would not likely be required. | Additional dwelling units under this plan would increase enrollment by almost 1,300 students over project enrollment. New facilities would be required to accommodate this increase. |
| **Police** | The project will create new demand for police services due to population, housing and other development. This will be mitigated by collecting impact fees on all new construction. | Would result in higher population and non-residential development than the project. However, additional officers would be provided through collection of development impact fees. | Police services would remain at current levels which are considered adequate to serve the population. | Would significantly reduce population compared with the project. Fewer new officers would be required under this plan. | Addition of 2,400 dwelling units would increase population by about 6,700 persons, thus creating a need for more officers than under the project. This would be mitigated by development impact fees. |
| **Fire** | The proposed Plan will create additional demands on existing fire protection services due to the increase in structures in the Planning Area. Development will be evaluated on a project-specific basis by the appropriate agency to determine potential impacts and mitigation. | Demand for fire protection would increase slightly in comparison with the project. Would be evaluated on a project specific basis to determine impacts and mitigation. | Fire protection demand would remain at present levels. Response times and levels of service are considered adequate. | Reduced impacts over proposed project since 25 percent reduction in development will result in a proportional decrease in fire protection services. | Would reduce commercial development over proposed project but be replaced by single-family residential which would not reduce potential fire hazards. |

| Topic | Alternative #1 Proposed Project | Alternative #2 Existing General Plans | Alternative #3 No Development | Alternative #4 Reduced Development | Alternative #5 Reduced Traffic |
|---|---|---|---|---|---|
| **Emergency Management** | Implementation of the proposed project will result in a population increase of about 35,000, subjecting additional people to the area's hazards and potential disasters. These impacts are mitigated by General Plan policies. | Would increase the Planning Area population by about 40,000 subjecting more people to potential hazards than the project. | Exposure of persons and property to potential hazards and disasters would remain at the current level. | Would reduce overall exposure of persons and property to potential hazards and disasters with a projected population increase of about 10,000. | The population increase of about 42,000 would expose more people to potential disasters than the project. |
| **Waste Management** | Additional population and development will result in an increase of solid waste generation. City policies and programs are designed to a reduction in per capita waste generation and an increase in recycling. | Existing General Plans would be subject to the same solid waste reduction goals as the project. | Population and development would remain at present levels. However, City policies are designed to continue reducing solid waste production. | Decreases in population and overall development will result in less waste generation than the project. | Replacement of some commercial with residential development would not substantially reduce solid waste generation, but would be subject to the same waste reduction and recycling policies. |
| **Energy** | Total electricity consumption at buildout is estimated to be 679,399,272 Kwh per year. Natural gas consumption is estimated to be 3,903,278,364 cubic feet per year. Both Southern California Gas and Southern California Edison have indicated that they will be able to meet gas and electrical demands related to the project and will expand facilities as needed. | Buildout under existing General Plans will result in a total electrical consumption of 754,206,649 kWh per year and total natural gas usage of 4,283,894,388 cubic feet per year. This alternative would create a greater demand for non-renewable energy resources than the project. | Energy consumption would remain at approximately 259,474,160, kWh of electricity per year and 2,138,707,764 cubic feet of natural gas per year. | Energy consumption would be slightly lower than the project under this scenario with an estimated electrical demand of 509,552,262 Kwh per year, and a natural gas demand of 2,927,490,804 cubic feet per year. Energy consumption would be about 25 percent lower under this scenario. | Total electrical consumption would be 541,547,822 kWh per year, while natural gas consumption is estimated to be 3,650,254,764 cubic feet per year. This alternative would yield a slight reduction in natural gas consumption, and electrical consumption would decrease by about 20% |
| **Electromagnetic Fields** | It is not anticipated that the project will subject additional persons to hazards from electromagnetic fields. | No reduction or increase of impacts in comparison with the project. | No reduction or increase of impacts in comparison with the project. | No reduction or increase of impacts in comparison with the project. | No reduction or increase of impacts in comparison with the project. |

# 20.0 CEQA TOPICS

Redlands General Plan / EIR

## 20.0 REQUIRED CEQA TOPICS

The following is a discussion on the cumulative impacts of the proposed General Plan. In addition, significant unavoidable adverse impacts, irreversible and irretrievable commitment of resources and growth inducing impacts are also discussed.

### 20.1 Cumulative Impacts

CEQA Section 15130 requires an analysis of cumulative effects found to be significant that includes a summary of projections contained in a related planning document; a summary of expected environmental effects; an analysis of cumulative impacts of related projects using the growth projected and an examination of options for mitigating or avoiding cumulative impacts.

The amount of development considered in a cumulative analysis depends on the resource being evaluated. If the resource is confined to the San Bernardino Valley, the cumulative impact analysis utilizes projections of growth from the San Bernardino Association of Governments (SANBAG). If a resource area includes the whole of Southern California, growth projections from the Southern California Association of Governments (SCAG) Regional Comprehensive Plan and Guide (January 1995) are utilized.

In other instances, the area considered for cumulative analysis is the service area of a service provider (e.g. Southern California Edison, Southern California Gas Company). In these cases, data furnished by the service provider are utilized in the cumulative analysis. Finally, for the topics of law enforcement and fire protection, development in Redlands itself and neighboring jurisdictions is handled within each jurisdiction and does not create a cumulative impact beyond municipal boundaries. Cumulative impacts are therefore not analyzed for these topics.

For the majority of topics, potential cumulative impacts created by development elsewhere in the valley are considered mitigable if all contributing jurisdictions implement mitigation that is practicable and feasible with current technology. This includes cumulative impacts associated with land use, open space, seismicity, geology and soils, agricultural lands, hydrology, biotic resources, mineral resources, climate, air quality and wind, historic, archaeologic, and paleontologic resources, visual quality, traffic and transportation, airport safety, noise and community services including water, sewer, parks, schools, police, fire, emergency management, waste management, energy and electromagnetic fields.

In a few cases, the identified cumulative impacts are considered unmitigable even if the affected jurisdictions were to apply all the mitigation that is currently practicable and feasible. These unavoidable impacts occur in the following areas:

- Agricultural Lands - the conversion of prime agricultural lands to urban uses, thus reducing the agricultural economy and some biotic habitats.
- Traffic - increase in the level of service on roadway segments.
- Noise - exceedance of noise standards on sensitive land uses due to vehicle and possibly air traffic.
- Open Space - reduction in the amount of open space due to urbanization pressures.
- Biotic Resources - reduction of the biotic diversity of plants and animals, reduction for mobility of remaining animal populations, and diminished habitats.
- Air Quality - continued exceedance of state and federal air quality standards, adding to the overall regional problem of clean air.

## LAND USE

Land use patterns proposed in the General Plan Update contribute to cumulative population growth in the San Bernardino Valley. Regional impacts in areas such as jobs/housing balance, traffic, noise and air quality (for example) are the cumulative result of land use decisions made by other jurisdictions in the Valley. The City may strive to achieve balance in its own General Plan, but these efforts may be compromised by other Cities' decisions which result in Valley-wide excesses or deficits in certain types of land uses or poor spacial arrangement of uses. These cumulative impacts are mitigable if all the jurisdictions in the Valley remain aware of each other's planning efforts and seek to achieve regional as well as local balances. Reference to San Bernardino Association of Governments (SANBAG) and Southern California Association of Governments (SCAG) data and projections during the planning process is an important means of incorporating the regional perspective in land use decisions.

## OPEN SPACE

Development of the Planning Area together with other development projected for the San Bernardino sub-region will convert a majority of open space to urban activities including residential, commercial and industrial uses. Continued development patterns will contribute to the potential cumulative loss of open space which can be considered valuable biological resources. These impacts are mitigable if all involved jurisdictions implement measures to mitigate impacts and preserve biological resources to the greatest extent feasible to the greatest extent feasible.

## SEISMICITY

### Geology and Soils

Development of the planning area together with other development projected for the San Bernardino sub-region will expose up to 2,469,000 people (SCAG estimate) by the year 2010, to differing levels of geologic hazards, including intensive grading of slopes; erosion from boulders; settlement and collapse of soils; corrosion from soils; landslides/mudflows; wind and water erosion; flooding; leakage from on-site sewage disposal systems and waste disposal facilities; fault movement; and ground rupture and shaking. This development will also contribute to the potential cumulative loss of mineral resources. These impacts are mitigable if all involved jurisdictions implement measures to mitigate geologic hazards and preserve access to mineral resources.

## AGRICULTURAL LANDS

Development of the Planning Area together with other development projected for the San Bernardino sub-region will convert agricultural lands to urban activities including residential, commercial and industrial uses. Continued development patterns will contribute to the potential cumulative loss of prime agricultural lands which can hinder the agricultural industry in the future. The Williamson Act of 1970 was enacted to allow landowners to enter into ten year contracts to maintain open use in exchange for taxation based on agricultural use rather than market value. Contracts renew automatically every year unless the owner or public entity serves notice of non-renewal, in which case the land becomes available for development 10 years hence. This can create a cumulative impact due to reduced prime agricultural lands across the sub-region. Although the Williamson Act preserves prime agricultural lands for at least ten years, long term preservation is not foreseen, due to development pressures. If all involved jurisdictions continue to support the Williamson Act, and property owners participate, impacts to prime agricultural land can be reduced for longer periods of time. The City of Redlands and County of San Bernardino also provide agricultural protection through zoning regulations and maintaining agricultural preserves which can help reduce cumulative impacts to these areas.

## HYDROLOGY

Buildout of the Planning Area, and of other jurisdictions in the San Bernardino sub-region, will increase impermeable surfaces and thus increase runoff. This increase in runoff will increase the drainage flows which currently exist in flood control facilities of the San Bernardino County Flood Control District (SBCFCD), San Bernardino Valley Municipal Water District (SBVMWD) and City of Redlands. Local flood control efforts require SBCFCD and SBVMWD review and approval, a mechanism for which is already in operation. As approval by these agencies is required for local jurisdictions to construct flood control improvements, especially those improvements which affect SBCFCD and SBVMWD facilities, mitigation of potentially significant impacts occurs as part of the design and review process. No significant cumulative impact is expected on existing valley wide flood control facilities as long as the local jurisdictions continue to adhere to SBCFCD and SBVMWD requirements.

## BIOTIC RESOURCES

Development of the San Bernardino sub-region will cumulatively impact the biological resources of the area. SCAG projects a population of up to 2,469,000 people in the San Bernardino sub-region by the year 2010. This increased population and an undetermined amount of associated development will result in a general decrease of biological diversity in the sub-region and could result in a loss of a number of plant and animal species. In addition, this development may result in a loss of officially listed plant and animal species and their habitats. The City should support regional programs targeted at reducing these cumulative impacts including coordinating with other agencies and counties in the Multi-Species Habitat Conservation Plan.

An examination of MEA Figure 7.1, Biotic Resources, reveals that some of the important biological sites identified fall at least partially outside of the Planning Area boundary. Damage to these areas from development outside of the City's jurisdiction constitutes a potential adverse cumulative impact on the important biological sites and the species which depend on them. Should the neighboring jurisdictions adopt measures which preserve their portions of important biological resources, this cumulative impact can be reduced. It should be noted that as development of the sub-region continues, biological resources will be further impacted. Continued implementation of existing requirements including conducting biological surveys, preserving valued habitat areas and requiring developers to pay habitat replacement fees will help reduce cumulative impacts to biological resources.

## MINERAL RESOURCES

There are a total of 5,060 acres in the Planning Area of construction aggregates in the Sectorized MRZ-2 Zone. Development of the Planning Area will impact approximately 13 percent, or 660 acres, of construction aggregate resources within the Sectorized MRZ-2 Zone. The remaining 4,400 acres will be preserved. Of the 799 acres in the reserve area, which is designated as a regionally significant resource area, by the California Department of Mines and Geology (CDMG), none are being impacted. The CDMG has identified significant aggregate resources within the Planning Area. The City of Redlands has polices in the General Plan to conserve sufficient aggregate resources to allow the conversion of two 50 year supplies to meet the Planning Area's contribution to future regional needs. If all jurisdictions in Southern California who issue mining permits for mineral resources coordinate with the CDMG, sufficient data can be gathered to designate areas as regionally significant in order to preserve this resource. This can significantly reduce cumulative impacts to mineral resources in Southern California.

## CLIMATE, AIR QUALITY AND WIND

Climate

Implementation of the General Plan and development of the sub-region is not anticipated to affect the climate in any noticeable or quantifiable way.

Air Quality

Implementation of the General Plan would result in generation of additional pollutants from stationary sources (construction activities, electrical and natural gas usage) and mobile sources primarily from increased vehicular travel. Short-term impacts will result from construction activities due to site disturbance and emissions from construction equipment. Implementation of the General Plan will result in 56.4 tons/day of Carbon Monoxide, 6.2 ton/day of Volatile Organic Compounds, 11.9 ton/day of Nitrogen Oxides, 1.0 tons/day of Sulfur, and 1.9 tons/day of Particulate Matter ($PM_{10}$).

Although the City of Redlands will comply with South Coast Air Quality Management District Rules and Regulations, the possibility for significant short-term and long-term adverse air quality impacts could occur as a direct or indirect result of buildout of the proposed General Plan Update. Project related cumulative air quality impacts, therefore, may also be significant. Any proposed future projects adjacent to the City of Redlands boundary will, in conjunction with this project, exceed the SCAQMD's significant threshold criteria.

It is not currently possible to mitigate these impacts to a level of insignificance. Adherence to the SCAQMD Rules and Regulations and compliance with locally adopted AQMP and PM10 control measures (in the form of General Plan Update text implementation programs) will help reduce the city-wide air pollutant burden. It is important, however, that the growth pressure experienced in the San Bernardino Valley be monitored as a whole, so that attainment of the state and federal ambient air quality standards occurs as projected.

Wind

Implementation of the General Plan is not anticipated to increase wind hazards within the planning Area. Since data on high wind areas within the Planning Area is not available, Plan policies specify the identification of such areas as data becomes available, and the protection of people and property from the adverse impacts of high winds.

**HISTORIC, ARCHAEOLOGIC, AND PALEONTOLOGIC RESOURCES**

Since the presence or absence of archaeological sites for areas that have not been adequately surveyed is unknown, it is difficult if not impossible to provide a quantitative discussion of cumulative negative impacts on archeological resources. In addition, the discovery of archeological sites, proper evaluation, and implementation of mitigation measures has a positive environmental impact component which somewhat offsets the negative impacts of site disturbance. This is because there is an increase in the amount of data collected which leads to greater knowledge and understanding of the prehistory and history of the area.

SCAG projects a population of up to 2,469,000 people in the San Bernardino sub-region by the year 2010. The greater and denser the development to accommodate this population, the more sites may be destroyed. If sites in the sub-region are destroyed without being evaluated, there will be a cumulative adverse impact on knowledge of Indian culture, since individual sites must be understood in the context of the entire interactive culture area. This impact can be mitigated by more sites being discovered, studied, and recorded, assuming that other lead agencies are properly addressing cultural resources in their environmental studies on a project per project basis.

**VISUAL QUALITY**

The cumulative impacts of the potential development of the City must be viewed together with other proposed developments within the cities of Highland, Loma Linda, San Bernardino, Yucaipa and Calimesa, and to some degree with other development planned throughout the sub-region.

The impacts of the Planning Area when taken together with all of the other projects in the sub-region will create a significant adverse impact. This results from the potential of a transformation of portion of the sub-region into urbanized uses. Jurisdictions outside of the City may choose to mitigate specific impacts (such as those resulting from hillside development) as Redlands has done. Although the transformation of the valley floor remains a significant cumulative impact, polices in the Redlands General Plan are intended to both enhance the visual quality of the City and mitigate adverse impacts of urban growth through implementing policies for City design and historic and scenic preservation. If other jurisdictions in the sub-region were to implement policies similar to those of Redlands (design and historic and scenic preservation), impacts to visual quality can be reduced.

**ENERGY**

Electricity

Development of the Planning Area will create a demand of approximately 259,487,612 Kwh per year of electricity at buildout. In addition, buildout of the Planning Area will contribute to a cumulative increase in demand for the extension of infrastructure in SCE's service area. SCE will be able to provide electrical service to development as it occurs, so long as all involved jurisdictions link development approvals to the provision of adequate electricity infrastructure at the developer's expense and require the setting aside of appropriate electrical easements.

Natural Gas

Development of the Planning Area will create a demand of approximately 2,136,308,364 cubic feet per month of natural gas at buildout. In addition, buildout of the Planning Area, along with other development in SCG's service area will create a cumulative increase in the demand for extension of SCG's infrastructure. This increase will not have an adverse impact on SCG's ability to provide services if all involved jurisdictions link development approvals to the provision of adequate natural gas infrastructure at developer expense and require the setting aside of appropriate natural gas easements. Cumulative impacts on energy will result in the consumption of nonrenewable energy resources (natural gas and petroleum products used to produce energy).

**TRAFFIC AND TRANSPORTATION**

The San Bernardino-Riverside CTP computer model used for the proposed project. The cumulative daily vehicle trips generated within the Planning Area at buildout would be approximately 101 million compared to the 0.47 million daily vehicle trips generated in 1994. Traffic in the region surrounding Redlands is projected to increase by 49% between 1994 and 2010. The overall growth in traffic demand on regional facilities would be 65% due to Redlands growth as well as regional growth.

Due to the magnitude of the growth projected for the San Bernardino Valley, it is unlikely that transportation programs (Transportation Demand Management, Transportation System Management), even if implemented regionally and by each jurisdiction, will be sufficient to reduce all cumulative traffic related impacts below a level of insignificance. Constraints on street widening and construction of new streets, further increase the likelihood that some roadway segments in the sub-region will reach unacceptable levels of service at least during peak periods. Cumulative traffic impacts can be reduced if all jurisdictions comply with the goals and policies in the Regional Mobility Element developed by SCAG.

**AIRPORT SAFETY**

The project will contribute to an increase in demand for airport facilities. The 2,469,000 people projected for San Bernardino sub-region by the year 2010 by SCAG would represent a significant increase in airline passengers for the Redlands Municipal Airport and the San Bernardino International Airport. Although Redlands

Municipal Airport is a small general aviation facility, it is expected to generate additional demand in the future. The San Bernardino International Airport (formerly Norton Air Force Base) is expected to generate a significant demand for airport services due to the increase in population in the general area. Funding generated for airport services through fees implemented by the cities and counties will be required to reduce impacts to a level of insignificance.

**NOISE**

The noise analysis completed by Endo Engineering analyzed the project's noise impacts on cumulative and local level. Noise levels in the project area will, however, increase in the future regardless of whether the project is implemented or not because of the inevitability of future development outside the project area. Noise levels on 28 of 64 specific roadways will increase at least 4db or more, resulting in a significant unavoidable adverse impact.

Noise in the sub-region will increase also due to development pressures in the area. If all jurisdictions comply with noise standards developed by State, Federal and Local agencies, noise impacts can be reduced, however, they will remain a significant regional issue. Policies set forth in the General Plan for the City of Redlands will help reduce impacts caused by increased traffic and short term construction activities. For further information on the ultimate noise levels that will exist in the project area at buildout, see the Noise Technical Background Study in the appendix of this environmental impact report.

**POLICE**

Law enforcement for development in the City is handled within its own jurisdiction and does not create a cumulative impact beyond municipal boundaries. Cumulative impacts, therefore, are not analyzed for law enforcement.

**FIRE**

Fire protection for development in the City is handled within its own jurisdiction and does not create a cumulative impact beyond municipal boundaries. Cumulative impacts, therefore, are not analyzed for fire protection services.

**PARKS**

Implementation of the General Plan will create additional demand on existing park and recreational services due to potential increase in population. Cities in the sub-region may indirectly mitigate the impacts of their residents on regional recreational facilities at least partially by providing adequate municipal facilities so that residents do at least some of their recreating close to home. A number of pocket, neighborhood and community parks exist as recreational outlets throughout Redlands and the surrounding area. The City of Redlands is a community with various public parks and a golf course which makes the City an attractor rather than a exporter of people looking for recreational facilities. This fact helps mitigate the project's contribution to the cumulative demand for park and recreation facilities outside the Planning Area. The cumulative impact of the sub-region population growth on these facilities, therefore, is considered insignificant.

**SCHOOLS**

The Redlands Unified School District (RUSD) serves the City of Redlands Planning Area, the cities of Loma linda, Highland, small portions of San Bernardino and Yucaipa, as well as some unincorporated areas of San Bernardino County. It is estimated that the population of Redlands will increase to approximately 101,644 people at buildout. Student generation for the Planning Area is estimated to be approximately 23,311 at buildout. Within the Planning Area, there are 9 elementary schools with another planned on Judson Street, 2 middle schools, and 2 high schools with one currently under construction and expected to open in 1997. It is anticipated that project enrollment will be served with the construction of the new high school and the planned elementary school

on Judson Street. In addition, the General Plan designates general location of two more elementary schools in the Greenspot and San Timoteo area. Implementation of the General Plan may create additional demands on school facilities due to potential increase in new construction. The District currently mitigates the impacts on school facilities from new development by the imposition of development impact fees on all new construction. Also, if the RUSD continues to work with surrounding communities, sufficient land for schools may be available for future educational facilities which can help reduce significant impacts to the schools within the district.

### WATER

Cumulatively, the projected population of San Bernardino County by SCAG of 2,469,000 by the year 2010 will add to the need for infrastructure to provide water. Developers are generally required to contribute toward the cost of this infrastructure which mitigates this potentially significant impact. For quantitative water usages, see sewer below.

As long as all involved jurisdictions link development approvals to the provision of fees for infrastructure, impacts to water sources can be reduced to levels of insignificance. See Section 7.0, Hydrology, of the EIR for a further discussion of cumulative impacts on groundwater withdrawals.

### SEWER

The Southern California Association of Governments projects a population of up to 2,469,000 people in the San Bernardino sub-region by the year 2010. This will add to the need for infrastructure to provide sewer service. Developers are generally required to contribute toward the cost of this infrastructure which mitigates this potentially significant impact. As long as all involved jurisdictions link development approvals to the provision of infrastructure, impacts to water sources can be reduced to levels of insignificance. See Section 16.0, Community Services, of the EIR for a further discussion of cumulative impacts on sewer.

Using the total amount of water usage for all activities (residential and non-residential) generated in the City of Redlands in one day and calculated on a per capita basis (i.e., 300 gpcd), the expected cumulative growth and associated cumulative impact is expected to be approximately 31,049,700 gpcd. This is a potentially significant adverse impact which can be avoided if all cities and the County require that water conservation measures are followed and sewage treatment capacities are expanded, as needed, to accommodate new development (with new developments paying for these improvements as required).

### EMERGENCY MANAGEMENT

Implementation of the General Plan will add approximately 26,000 people to the Planning Area at buildout. All these people will be subject to the area's major disasters and natural hazards and will need protection and services in the event of an emergency. The projected population of San Bernardino County by SCAG of 2,469,000 by the year 2010 will also require the need for additional protection and services in the event of a major disaster. As long as local jurisdictions adopt Emergency Disaster Plans, as Redlands has done, protection and services can be provided to reduce impacts caused by major disasters or natural hazards. Emergency Disaster Plans should be revised every two years to reflect the area's changes due to annexations or other planning activities.

### WASTE MANAGEMENT

Southern California generates more than 22 million tons of solid waste per year. In 1990, approximately 77,400 tons of solid waste was generated in the City of Redlands. Implementation of the General Plan will generate approximately 1.9 million tons of solid waste by the year 2015. California Integrated Waste Management Act of 1989 (formerly AB939) requires local governments to reduce the amount of solid waste generated in their jurisdictions and disposed of in a landfill or other means by 25% by the year 1995 and by 50% by the year 2000. If all jurisdictions in southern California implement policies in the General Plans to reduce the generation of solid waste, diversion goals can be met and impacts to landfills can be reduced.

**ELECTROMAGNETIC FIELDS**

Implementation of the General Plan is not anticipated to place residential development or other sensitive uses in proximity to the existing high voltage transmission lines (220 kilovolts) which traverse the southwest corner of the Planning Area. Most of these lines are remote from existing housing areas. Existing impacts associated with the potential electromagnetic field hazards are considered minimal. If jurisdictions in the sub-region support research into the health effects of electromagnetic fields generated by power transmission lines and other sources, as Redlands has done, reduction in hazardous exposure to residents can be minimized.

## 20.2 Significant Unavoidable Adverse Impacts

Any project which provides guidelines for the development and/or redevelopment of approximately 33,000 gross acres will necessarily have a variety of impacts on the environment. The impacts of this project are discussed in detail in Sections 1-18 of this report. Nearly all of the impacts identified as significant in these sections can be mitigated entirely or reduced to a level of insignificance through the implementation of guiding and implementing policies described for each impact. However, certain significant environmental impacts remain which cannot be mitigated to a level of insignificance by means that are practicable and feasible with current technology. The unavoidable environmental effects of the project (significant cumulative impacts are discussed above) include the following:

- Incremental buildout caused by development may result in the loss of officially listed plant and animal species and their habitat and of locally important habitats.
- Incremental buildout caused by development may result in the loss of open space.
- The continued conversion of prime agricultural lands to urban uses.
- There will be unavoidable consumption of non-renewable energy resources including fossil fuels.
- Incremental buildout of the Planning Area will contribute to increased traffic congestion on local streets and create difficulties in maintaining adequate levels of service.
- Exceedance of noise standards on sensitive land uses due to vehicle and possibly air traffic.
- SCAQMD threshold criteria for all pollutants will be exceeded on a long-term basis.

## 20.3 Irreversible and Irretrievable Commitment of Resources

Development of the Planning Area will constitute an irreversible and irretrievable commitment of the following non-renewable resources: open, agricultural and vacant land, energy resources (natural gas, coal, oil, fossil fuels), water, construction materials (lumber, gravel, sand, asphalt, metal), minerals, biological resources, and clean air.

The Redlands General Plan Update will allow for the continued significant conversion of large open, agricultural and vacant spaces in the Planning Area to urban uses (see Section 4.0 Open Space, of the EIR for further discussion). The value of the undeveloped portions of the area as open space will be effectively lost with new development. There will also be the permanent loss of biological habitat resources because continued development of the City will result in an alteration of existing landforms in order to accommodate development, and will eliminate some native vegetation and wildlife habitat (see Section 8.0, Biotic Resources, of the EIR for further discussion). The potential loss of open space under the proposed General Plan is partially addressed by the designation of portions of the Planning Area as permanent open space and very low density residential development.

Buildout under the proposed project will lead to the long-term irreversible commitment of energy resources from non-renewable fossil fuels, coal and oil. These resources will be consumed through the heating and cooling of air and water, use in commercial and manufacturing operations, and by internal combustion for propulsion motor vehicles and will constitute an irretrievable loss once consumed (see Section 17.0, Energy, of the EIR for further discussion). The potential consumption of energy resources by development permitted in the Planning Area under the proposed project is partially addressed by conservation measures identified in this EIR as well as energy production encouraged in wind, solar and cogeneration facilities.

The project will continue to contribute to a cumulative loss of natural water resources in the San Bernardino sub-region, and contribute to additional need to continue the importation of additional water to recharge the subbasin (see Section 7.0, Hydrology). Furthermore, inasmuch as there are not infinite supplies of fresh water available to share among all communities which rely upon imported water (although the drought for this year may be over), the water crisis in the southwest, particularly in Southern California, would appear to be inevitable. The impact of the proposed project on natural water supplies is partially addressed through conservation measures identified in this EIR, including use of reclaimed water, use of water conserving devices, and incorporation of drought-tolerant landscaping into project design. The impact of water loss on natural habitat is partially addressed through controlling development adjacent to surface streams and springs.

The volume of traffic in the Planning Area will increase incrementally with development of the proposed project, resulting in the additional consumption of non-renewable fossil fuels. The increase in Vehicle Miles Travelled in the Planning Area will result from the incremental increase in the population and thus the number of automobiles required to serve the population, and as a result of the increase geographical expanse of urban area. This impact is partially addressed through implementation of Transportation Demand Management (TDM) and other trip reduction mechanisms, and by the increased utilization of mass transit as required by mitigation in this EIR (see the Traffic Study Technical Report for further discussion).

Air quality in the Planning Area, and the San Bernardino sub-region, will be degraded as a result of project and cumulative urban growth. Chiefly through automobile generated pollutants and grading activities, the amount of pollutants and particulate levels in the vicinity of the Planning Area will increase, although the major cause of air quality problems will continue to be pollutants carried in from elsewhere in the air basin. Project related impacts on air quality is partially addressed by state and federal clean air standards, policies in the General Plan with regards to grading, and mitigation in this EIR requiring trip reduction programs and particulate suppression in new development (see Section 10.0, Climate, Air Quality and Wind, of the EIR for further discussion).

## 20.4 Growth Inducing Impacts

The General Plan Update is by definition growth-inducing, since its purpose is to provide long-range planning for the anticipated addition of 35,343 new permanent residents and approximately 31,513,000 square feet of new commercial/office/industrial uses. The project will induce growth by designating land for future residential and commercial/industrial development and by providing for the orderly extension of public services and utilities to new areas of development.

Generally speaking, in-fill development in existing urbanized areas is considered less growth-inducing than is the extension of urban infrastructure to previously unserved areas. The project does provide for in-fill of the currently vacant lands which has historically characterized development in the City. The amount of development created by in-filling, however, would not be sufficient to accommodate the anticipated future demand for housing and employment.

The size of the project (involving a population increase of 35,343 residents and the creation of up to 82,861 jobs will also create a type of growth inducement known as the "multiplier effect". The "multiplier effect" is said to occur when a project which is large relative to the surrounding area induces additional community growth, not necessarily adjacent to the site or of the same type of use as the project itself. This effect is anticipated because the growth associated with the project is heavily weighted in favor of jobs. This scenario will create a balancing

demand for housing elsewhere within the sub-region and in other communities within commuting distance of Redlands. These commuters will in turn create a demand for increased commercial acreage in the region. Despite the project's designation of new commercial uses in the City, some residents will continue to do some of their shopping elsewhere in the sub-region, contributing to commercial growth.

In describing how growth-inducing impacts are to be treated in an EIR, CEQA Guidelines Section 15126(g) states that "[i]t must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment."

Given that a project's level of impact in such areas as traffic, air quality and community services is related to the density of development permitted, the goal of a balanced General Plan should be to facilitate the amount and kind of growth necessary to achieve a city's social and fiscal goals without promoting excessive growth which will be costly to the city in terms of environmental impacts and providing services.

# 21.0 MONTIORING

Redlands General Plan / EIR

## 21.0 MONITORING AND REPORTING

The Environmental Impact Report (EIR) for the Redlands General Plan Update indicates that the "project" may have significant adverse impacts on the environment. Mitigation measures must be provided which reduce or avoid these significant impacts. The California Environmental Quality Act (Public Resources Code 21081.6) requires that for mitigation measures proposed within an EIR, a system of ensuring implementation of these measures must be instated. Mitigation measures have been identified under each topic where significant impacts have been found. In the case of the Redlands General Plan, the identified mitigation measures for this "project" are the Plan's implementing policies, which were designed to avoid the need for additional mitigation measures. Taken together as an interlocking, interdependent program, the implementing policies outline specific actions that the City shall undertake within the next 15 years and constitute those actions that, when fully applied, will lead to implementation of the General Plan and at the same time, help mitigate significant impacts on the environment.

The requirement for a mitigation monitoring or reporting program complements the longstanding requirement that each planning agency provide "an annual report to the legislative body on the status of the plan and progress in its implementation " (Government Code 65400). Thus, the monitoring and reporting requirement may be fulfilled by the City's preparation of its annual report.

The annual report should note the status of implementation actions that must be initiated by the City, as a part of the General Plan. For example, the Plan may call for a study to be prepared, an action considered, a program initiated, or an ordinance administered. The annual report must review and examine whether these activities have occurred, and should document their progress. Inclusion of a schedule and budget for those activities as a part of the annual report would be useful in ensuring their full implementation. The annual report shall serve as the primary monitoring program for ensuring that policies and programs of the General Plan are being executed. In this way, the annual report will assist the City in monitoring the progress on the implementation of the General Plan through the year 2010.

The annual report is an appropriate arena for considering cumulative development, and determining whether GP Table 4.1 (which shows land use totals) needs revision as a result of project approvals that significantly affect the citywide or planning sector totals. This DEIR was formulated based on the land use totals presented in GP Table 4.1, and alterations of those figures could out-date the analysis contained herein.

As noted in the introductory section, the MEA should be reviewed periodically and revised as needed so that it is current and accurate. Several "milestones" are cited there that, when achieved, should trigger an update of the relevant MEA section(s). Those milestones are reprinted here, since they are the type of implementing actions that should be monitored in the annual report; they are not, however, the only actions that require monitoring. These "milestones" include the following:

- Designation of Historic and Scenic Conservation areas and the establishment of priorities for protection of subareas based on both significance and endangerment. (Policy 3.21a)
- Updating the Redlands Municipal Airport Master Plan. (Policy 5.70c)
- Preparation of a Trails Plan. (Policy 7.11b)
- Preparation of a Master Biotic Management Plan. (Policy 7.21g)
- Updating the City of Redlands' Water Master Plan. (Policy 7.22e)
- Identification of significant nonrenewable paleontologic resources. (Policy 7.30f)

- Establishment and implementation of the San Bernardino County Congestion Management Program (CMP). (Policy 8.11g)

- Establishment and implementation of a Travel Demand Management (TDM) Program. (Policy 8.12k)

- Drafting fire protection standards suitable for Rural Living areas not exposed to high wildland fire hazards. (Policy 8.30e)

- Preparation of a Master Drainage Plan. (Policy 8.40h)

- Possible amendment to the Zoning Ordinance to include restrictions for soil types with development constraints similar to the Saugus Sandy Loam series. (Policy 8.50j)

- Identification of areas susceptible to high winds. (Policy 8.60b)

- Continued update and revision of the City's Emergency Plan. (Policy 8.90c)

- Identification of mineral resource and reserve areas and areawide aggregate transportation routes. (Policy 7.42d)

- Development of a Comprehensive Airport Land Use Plan for the Redlands Municipal Airport which evaluates the surrounding land uses in light of airport operations. (Policy 5.70g)

Other actions that may not be included in the annual report are more general in nature but are also considered "milestones." These actions may be those already being implemented by current policies which do not require the designation, updating, preparation, identification, establishment of, or amendments to, certain issues as those listed above.

It should be noted that as new developments are proposed within the Planning Area, the City can use the policies adopted in the General Plan to mitigate significant impacts on the environment caused by those projects. If the City feels that additional studies are needed for individual projects, then such studies can be required at the cost of the developer. The City can also use the information in these additional studies to update their existing conditions within the MEA sections of this document. This will also assist the City in the annual report on the implementation of the General Plan.

# 22.0 REPORT AUTHORS

Redlands General Plan / EIR

## 22.0 REPORT PREPARATION STAFF, CONSULTANTS, AND BIBLIOGRAPHY

### A. Report Preparation Staff

Lead Agency

City of Redlands
Community Development Department
Post Office Box 3005
Redlands, California 92373
(909)798-7555

Jeffrey L. Shaw, AICP, Director of Planning & Community Development Department

EIR Coordinator/Report Preparation

Smith, Peroni & Fox, Planning Consultants, Inc.
960 East Tahquitz Canyon Way, Suite 103
Palm Springs, California 92262

Michael A. Peroni, Vice President
Paul DePalatis
Martin Magana
Chris Del Ross
David Merriman
Sean Scully
Jessica Morin
Kathleen Mayock
Blayney Dyett Greenberg, Urban and Regional Planners
70 Zoe Street
San Francisco, California 94107

John Blayney
Kim Charnofsky
Rajeev Bhatia
Kim Da Costa
Darren Campeau
Clare Watsky
Former Staff:
David Brandt
Brian Collett
Wayne Heiser
Iris Sisson
Janice Stern
Asa Persson

Geologic Consultant

Steven C. Suitt & Associates
30020 Windward Drive
Canyon Lake, California 92587

Steven C. Suitt, CEG

Noise Consultants

Endo Engineering
95 Argonaut, Suite 115
Aliso Viejo, California 92656-1487

Gregory Endo
Vicki EndoMestre Greve Associates
280 Newport Center Drive, Suite 230
Newport Beach, CA 92660

Archaeology Consultant

| | |
|---|---|
| Archaeological Information Center<br>2024 Orange Tree Lane<br>Redlands, California 92374 | Robin Laska |

Air Quality Consultant

| | |
|---|---|
| Endo Engineering<br>95 Argonaut, Suite 115<br>Aliso Viejo, California 92656-1487 | Gregory Endo<br>Vicki Endo |

Traffic Consultant

| | |
|---|---|
| DKS Associates<br>1956 Webster Street, Suite 300<br>Oakland, California 94612 | Michael A. Kennedy<br>Mike Aronson |

Land Use Consulant

| | |
|---|---|
| ESRI<br>380 New York Street<br>Redlands, California 92373 | Jon Harrison<br>Matt Bottenberg |

Economic Consultant

| | |
|---|---|
| Angus McDonald & Associates | Robert E. Goldman |

## B. Bibliography

OPR, CEQA Guidelines, Section 15169, subdivision (b), 1992.

*CA Dept. of Conservation, "Farmland Mapping and Monitoring Program", 1995.

*CA Dept. of Fish & Game, "Natural Diversity Database", 1995.

*Calimesa, City of, "City of Calimesa General Plan", 4/4/94.

Highland, City of, "City of Highland General Plan", 1990.

Loma Linda, City of, "City of Loma Linda General Plan", as amended through 1995.

*Moreno Valley, City of, "City of Moreno Valley General Plan", Mar.1989, Planning Network.

*Redlands, City of, "City of Redlands Emergency Plan", 1990.

Redlands, City of, "Crafton Community Planning Study", June 1987, California State Polytechnic University, Pomona

Redlands, City of, "Downtown Specific Plan, No. 45", June 1994, Gast-Hillmer Urban Design.

*Redlands, City of, "Household Hazardous Waste Element (HHWE) GPA 45", Mar.92, Adopted Jul.94.

Redlands, City of, "Live Oak Canyon - Southeast Area General Plan Amendment No. 38 FEIR", October 1987, Tom Dodson and Associates.

Redlands, City of, "Redlands 2000 Citrus Forum Report, December 1987.

Redlands, City of, "Redlands Municipal Airport Master Plan FEIR", August 1981, Taylor Research Associates.

Redlands, City of, "Redlands Municipal Airport Master Plan", Nov. 1993, Coffman Assoc., Inc. Airport Consultants

Redlands, City of, "Redlands Revitalization Program, DEIR", April 1984, Arroyo Group.

*Redlands, City of, "Source Reduction & Recycling Element (SRRE)", Mar.92, Adopted Jul.94.

Redlands, City of, "Water Master Plan", 1984.

City of Redlands, Department of Public Works, Water Division, "Water Master Plan Update", 1981, 1984.

Redlands, City of, Department of Public Works and San Bernardino, County of, Flood Control District, "Mill Creek Zanja Detention Basin Study", 1986, Williamson Schmid.

Redlands, University of, "University of Redlands Master Plan", 1991 (revised).

Regional Water Quality Control Board, "Water Quality Control Plan, Santa Ana River Basin Plan", 1984, Amended to 1989.

Riverside County, "Multiple Species Habitat Conservation Plan Draft", January 1991, Dangermond and Associates, RECON.

Riverside, County of, "Oak Valley Specific Plan", 1988, Landmark Land Co.

San Bernardino, City of, "City of San Bernardino General Plan", 1989, Envicom.

*San Bernardino, County of, ""Sterling on the Green" PUD (Marlborough Development Co.)", 1994-95, Robert Bein, William Frost & Associates.

*San Bernardino, County of, "County of San Bernardino General Plan FEIR", April 1989, ERCE, Sedway, Cooke & Assoc.

*San Bernardino, County of, "County of San Bernardino General Plan", Rev. 12/1993, S.B. County Planning.

*San Bernardino, County of, "County Open Space Element", 7/1991, Randolph Hlubik & Associates.

San Bernardino, County of, "Crafton Hills Planned Unit Development DEIR", November 1984, Envicom Corporation.

San Bernardino, County of, Office of Special Districts, County Service Area 110, "East Valley Corridor Specific Plan FEIR", October 1988, URS Consultants.

San Bernardino, County of, "East Valley Corridor Specific Plan", Sept. 6, 1989.

*San Bernardino, County of, "General Plan Hazard Overlay", 12/1993.

San Bernardino, County of, "Hazardous Waste Plan", Feb. 1990.

San Bernardino, County of, and Cities, "Regional Air Quality Plan", March 1991, The Planning Center.

San Bernardino, County of, "Santa Ana River Resource Management Plan: Scoping Project", April 1988, URS Consultants.

San Bernardino, County of, "Sunrise Ranch Planned Unit Development and General Plan Amendment FEIR", January 1986, Planning Group.

*SANBAG, "Congestion Management Plan", Nov. 1992, SANBAG.

*SCAG, "Growth Management Element", 1994, SCAG.

*SCAG, "Regional Mobility Element", 1994, SCAG.

SCAG, Regional Comprehensive Plan and Guide, January, 1995.

South Coast Air Quality Management District, "Air Quality Management Plan", 1991.

Western Heights Water Company, The "Annual Water Quality Report", December 31, 1994.

*Yucaipa, City of, "City of Yucaipa General Plan", Sept. 1992, J.L. Webb Planning, Inc..

# 23.0 CONTACTS

Redlands General Plan / EIR

## 23.0 AGENCIES, ORGANIZATIONS & PERSONS CONSULTED

City of Redlands

| | |
|---|---|
| Administrative Services Director | Marjorie Pettus |
| Municipal Utilities Dept. | Gary G. Phelps, Director<br>Mike L. Huffstutler, Assistant Utilities Director<br>K. Louis Perkins, Engineering Manager |
| Fire Department | Leonard Temby, Fire Marshal<br>Mel Enslow, Fire Chief |
| Planning Department | Jeff Shaw, Community Development Director<br>Manuel Gaitan, Senior Planner<br>Tom Grahn, Associate Planner<br>Richard Malacoff, Associate Planner<br>Eric Norris, Principal Planner<br>Evelyn Pedro, Secretary<br>Karen Kellingsworth, Sr. Admin Clerk |
| Police Department | Clete Hyman, Captain |
| Public Works Department | Ron Mutter, Director |
| City Attorney | Dan McHugh |
| County of San Bernardino | Ed Lagage, Agricultural Commissioner<br>Bud Wright, Agricultural Biologist |
| Building and Inspection | George Anchales |
| Environmental Health Services | Brian Otter<br>John Bowman, Consulting Geologist |
| Environmental Health Services, Land Use Division | Suzanne Stowell |
| Environmental Public Works Agency Solid Waste Management Department | Ken Williams, Planning Intern, Planning and Recycling Division<br>Bryan Welbourne |
| Transportation/Flood Control Department | Mina S. Ghaly, Chief of Federal Projects/ Flood Control Engineering<br>Lou Gamache, Chief of Transportation Program Management Division<br>Robert Corchero, Chief of Flood Control Planning Division<br>David Lovell |
| Environmental Health Services | Jackson Crutsinger, Environmental Planner<br>Hazardous Materials/Facility Siting |

| | |
|---|---|
| Land Management Department | William Adams |
| San Bernardino County Museum, Archaeological Information Center | Lester Ross |
| San Bernardino County Museum of Natural History | Gene Kardiff, Curator |
| Planning, Land Use Management | Charles Fahie, East Valley Planning Team |
| Sheriff's Department | Lieutenant Robert Quintard<br>Sergeant Dunn<br>Wes Reeder, County Geologist |

Others

Assemblyman Richard Katz' Office, Kathy Van Osten
Bear Valley Mutual Water Company, John Schone, General Manager
California Highway Patrol, Corporal Savage, Public Affairs Officer
California Native Plant Society, Kevin Moore, President
C.S.U. San Bernardino, Meteorology Department, Ted McDowell
City of Loma Linda, Jason Eliason and Robert Gloser
City of San Bernardino, Engineering Department, Mike Grubbs, Civil Engineer
Crafton Hills Conservancy, Robert Galbraith, Chairperson
Dr. Harold Hill, Citizen, Activist
Employment Development Department, Connie Lau, Researcher
Friends of Live Oak Canyon, Albert J. Kelley, Board Member and David Matuszak
Friends of San Timoteo Canyon, Bill Cunningham
Kearny Agricultural Center, Dr. David Grantz, Plant Physiologist
Lawrence Berkeley Laboratory, Dr. Akhbari, Energy Analyst and Philip Barker, Urban Forester
Nature Conservancy, Coachella Valley Preserve, Cameron Barrows
Norton Air Force Base, Mr. Raymond
Orange County, Environmental Management Agency, Real Estate, Elaine Rail
Redlands Municipal Airport, Phil Locke, Airport Manager
Redlands Wastewater Treatment Plant, Glenn Holding, Chief Operator and Jamie Stewart
Regional Water Quality Control Board, Cameron Sirini and Glenn Robertson, Environmental Specialist/Engineering Geologist
Regional Water Quality Control Board, Robert Nickland and Roger Turner
Riverside County Parks, Kristi Lovelady, Project Planner
San Bernardino Regional Parks Department, Gerry Newcombe
San Bernardino Valley Audubon Society, Robert McKernan, President and Scott White, Conservation Committee Chairperson
San Bernardino Valley Municipal Water District, G. Louis Fletcher, General Manager, Randy Vangelder, Robert Reider, Steve Stockton, and Sam Fuller, Operations Manager
San Bernardino Valley Water Conservation District, Peter Rusher, Manager
SANBAG, Ty Schuling
Santa Fe Railway, Robert Bundy, Manager of Operations Planning
Senator Alan Robbins' Office
Sierra Club, San Gorgonio Chapter, Anne Dennis, President
South Coast Air Quality Management District, Alene Taber, Barry R. Wallerstein, Director of Planning, Connie Day, and Monty Price
Southern California Association of Governments, Javier Minjares, Teri Yergan, and Joe Carreras

Southern California Edison Company, Planning Department, Don Lally, Ray R. Gonzalez, Sy Granillo Area Manager, and Robert Weekes, District Manager
Southern California Gas Company, John Dewitt
State of California, Department of Finance, Doloros Cykeus
State of California, Department of Transportation, Christa-Maria Engle
Southern Pacific (Railroad) Transportation Company, George Fetty, Assistant General Manager
State Department of Fish and Game, Environmental Services Department, Bruce Eliason, Supervisor
State Department of Fish and Game, Natural Diversity Data Base, John Palmer and various staff State Department of Forestry and Fire Protection State Division of Mining and Geology, David Beebe
State Division of Mines and Geology, Chuck Real, Shaking Program and Earl Hart, Program Manager of Alquist-Priolo Zones
State of California, Waste Management Board, Michelle Marconi
Tri-County Conservation League, Gertrude Hagum, Greg Ballmer, President
U.C. Los Angeles, Dr. Arthur Winer
U.C. Riverside, Air Pollution Research Center, Dr. Cliff Taylor, Horticulturalist and Dr. Mudd, Director
U.C. Riverside, Cooperative Extension, Dennis Pittinger and Dr. Guy Witney, Advisor
U.C. Riverside, Deep Canyon Research Center, Philip L. Boyd
U.C. Riverside, Department of Earth Sciences, Dr. Tom Scott
U.C. Riverside, Extension, Jane Block and Shiela Keyes
U.S. Army Corps of Engineers, Dionicio Gonzalez, U.S. Army Corps of Engineers, Tom Adams, James Link, Ken Morris, Lucy Estrada
U.S. Army Corps of Engineers, Planning Section, Brian Whalen
U.S. Environmental Protection Agency, Ida Tolliver, James Vreeland, and Jim Radle
U.S. Fish and Wildlife Service, Gail Kobetich, Supervisor
U.S. Forest Service, San Bernardino National Forest, Melody Lardner, Botanist, Susan Sferra, Wildlife Biologist, Steve Low

# APPENDICES

Redlands General Plan / EIR

# APPENDIX A
# Buildout Land Use Assumptions

This Appendix serves a technical reference for the Redlands General Plan and summarizes the assumptions upon which General Plan buildout calculations are based. Buildout calculations are in turn used as the basis of much of the impact assessment in the General Plan Draft Environmental Impact Report.

## Residential Intensity, Population Density, and Building Intensity Assumptions

The following general assumptions concerning residential intensity, population density, and building intensity were used in developing calculations of buildout potential under the General Plan. For each land use designation, the General Plan specifies either a range of residential intensities or a maximum floor-area ratio (FAR).

Standards of intensity for residential uses are stated as the allowable number of dwelling units per gross acre. The assumed average number of persons per dwelling unit for residential designations has been extrapolated from estimates by the California Department of Finance for the City of Redlands.

Standards of building intensity for non-residential uses are stated as maximum floor-area ratios (FARs). An FAR is a ratio of the gross building square footage permitted on a lot to the net square footage of the lot. For example, on a site with 10,000 net square feet of land area, an FAR of 1.0 will allow 10,000 gross square feet of building floor area to be built. On the same site, an FAR of 1.5 would allow 15,000 square feet of floor area to be built. On the same site, an FAR of 2.0 would allow 20,000 square feet; and an FAR of .05 would allow 5,000 square feet.

The buildout assumptions (i.e. dwelling units per acre, FAR) used in this EIR have been adjusted based on historical experience, for the likely intensity of actual development. Adjusted FARs have been applied to the acreage within each land use designation to develop buildout calculations except in cases where specific projects have been proposed. In such cases, specific project information has been substituted for acreage calculations since it represents a more refined data source.

Population projections are based on a figure of 2.76 persons per household for all residential categories as identified for the City of Redlands. (California Department of Finance, Demographic Research Unit, 4-28-94)

## 1. Residential

**Resource Conservation**
This category is targeted at preservation of 30+% slopes but allows limited residential development
Assumes residential buildout at 0.1 units per gross acre (10 gross acres per unit)

**Rural Living (RL)**
Allows up to 0.2 units per gross acre (2.5 gross acres per unit) on slopes of 0-15%
Allows up to 0.4 units per gross acre (5 gross acres per unit) on slopes greater than 15%
Assumes residential buildout at 0.2 units per gross acre of vacant land on 0-15% slopes
Assumes residential buildout at 0.4 units per gross acre of vacant land on slopes greater than 15%

**Very Low Density Residential (VLDR)**
Allows up to 2.7 units per gross acre on slopes of 0-15%
Allows up to 0.4 units per gross acre (2.5 gross acres per unit) on slopes greater than 15%
Assumes residential buildout at 2.1 units per gross acre of vacant land on 0-15% slope
Assumes residential buildout at 1.0 units per gross acre of vacant land on slopes greater than 15%
(0-15% assumed density based on actual R-E subdivision project, 14,000 sf min lot size)

**Low Density Residential (LDR)**
Allows up to 6.0 units per gross acre.
Assumes residential buildout at 3.5 units per gross acre of vacant land
(0-15% assumed density based on actual R-1 subdivision project, 7,200 sf min lot size)

**Low Medium Density Residential (LMDR)**
Allows up to 8.0 units per gross acre
Assumes residential buildout at 8.0 units per gross acre of vacant land

**Medium Density Residential (MDR)**
Allows up to 15.0 units per gross acre
Assumes residential buildout at 15.0 units per gross acre of vacant land

**High Density Residential (HDR)**
Allows up to 27.0 units per gross acre
Assumes residential buildout at 27.0 units per gross acre of vacant land

## 2. Commercial, Industrial, and Office

**Office (O)**
Assumes Office Buildout at an FAR of 0.40 adjusted for vacancy, lot inefficiencies and ROW.
(FAR based on comparison of recent office projects in the City of Redlands)

**Commercial (C)**
Within the Commercial designation, the following land uses were quantified with FAR assumptions as follows adjusted by TAZ for vacancy, lot inefficiency, and ROW loss. FARs are based on comparison of recent projects in the City of Redlands.

Assumes Retail buildout at an FAR of 0.25
Assumes Office buildout at an FAR of 0.40
Assumes Service buildout at an FAR of 0.25

**Commercial-Industrial (C-I)**
Within the Commercial-Industrial designation, the following land uses were quantified with FAR assumptions as follows adjusted by TAZ for vacancy, lot inefficiency, and ROW loss. FARs are based on comparison of recent projects in the City of Redlands.

Assumes Retail buildout at an FAR of 0.25
Assumes Office buildout at an FAR of 0.40
Assumes Industrial buildout at an FAR of 0.40
Assumes Service buildout at an FAR of 0.25

**Light Industrial (LI)**
Assumes Industrial buildout at an FAR of 0.40 adjusted for vacancy, lot inefficiencies and ROW.
(FARs based on comparison of recent industrial projects in the City of Redlands)

## 3. Other

**Public Institutional**
Assumes development potential based on specific facilities.

**Parks/Golf Courses**
Assumes development potential based on specific facilities.

**Agriculture**
Assumes no development potential.

**Flood Control/Construction Aggregates/Conservation/Habitat Preservation**
Assumes no development potential.

## Nonresidential Area Assumptions/Adjustments

### East Valley Corridor

The East Valley Corridor is the largest "block" of undeveloped commercial/industrial land identified within the City of Redlands. It is designated on the General Plan Land Use Map primarily by the Light Industrial category and by the Commercial (C) and Commercial-Industrial (CI) categories which allow "mixed uses" including retail, industrial, and office facilities. Since these "mixed use" designations are not sufficiently specific for purposes of traffic analysis, it was determined that the East Valley Corridor Plan should be consulted in converting these designations to others which were more suitable for traffic analysis. After reviewing the East Valley Corridor land use descriptions, assorted Concept Plans and proposed and/or constructed development projects within the East Valley Corridor, equivalent nonresidential land use categories (retail, industrial, office) were quantified for projection purposes. General buildout assumptions for this area are listed as follows:

| GP Category | Projection Category | |
|---|---|---|
| General Commercial | 60% Office | |
| | 39% Retail Low | |
| | 1% Retail Med | |
| Commercial Industrial | (N of I-10 Fwy) | (S of I-10 Fwy) |
| | 45% Lt Industrial | 70% Lt Industrial |
| | 45% Office | 15% Office |
| | 10% Retail Low | 15% Retail Low |

12% reduction for future streets
10% vacancy factor
10% FAR adjustment (utility easements, flood control facilities, freeway noise setbacks, Wash inefficiencies)

### East Valley Corridor Concept Plans

Within the East Valley Corridor, a number of approved Concept Plans (currently undeveloped), Specific Plans (partially constructed), along with two pending development projects which further refine the intent of the East Valley Corridor Specific Plan. These include the following:

- Barton Center (Concept Plan #1) - TAZ 16
- Marigold Business Park (Concept Plan #2) - TAZ 68
- Marigold Plaza (Concept Plan #3) - TAZ 17
- Redlands Research Park (SP 42, Captive Plastics) - TAZ 17
- Centennial Commerce Park (SP 33, Orange Tree Lane) - TAZ 19
- East Valley Complex (SP 25, Orange Tree Lane) - TAZ 18, 19
- Citrus Plaza (Majestic Realty Company) - TAZ 13
- Cities Pavilion - TAZ 12

In areas where specific development plans have been prepared, information contained in the plan, including the character of development and land use acreage breakdowns, were used to determine nonresidential buildout square footages. As in the EVCSP in general, where mixed use categories (C, CI) are proposed as part of a Concept Plan, conversions have been used to quantify the square footage of more specific nonresidential land uses (retail, industrial, office). General buildout assumptions for these areas are listed below.

| Concept Plan Category | Projection Category |
|---|---|

**TAZ 12**

- **Cities Pavilion**

| | |
|---|---|
| General Commercial | 30% Office<br>70% Retail Low |

**TAZ 13**

- **Citrus Plaza (Majestic Realty Co.)**

| | |
|---|---|
| General Commercial | 100% Retail Low (approx 1,850,000 sf) |

**TAZ 16**

- **Barton Center (Concept Plan #1)**

| | |
|---|---|
| Commercial Industrial<br>(168.4 acres) | 30% Office<br>70% Lt Industrial |
| General Commercial<br>(59.8 acres) | 70% Office<br>28% Retail Low<br>2% Retail Med |
| Medical Facilities<br>(13.8 acres) | 100% Hospital |
| Open Space<br>(13.8 acres) | N/A |

**TAZ 68**

**Marigold Business Park (Concept Plan #2)**

| | |
|---|---|
| Commercial Industrial<br>(40.0 acres) | 75% Lt Industrial<br>29% Retail Low<br>1% Retail Med |
| Regional Industrial<br>(190.9 acres) | 100% Lt Industrial |
| Open Space<br>(10.9 acres) | N/A |

**TAZ 17**

**Combined TAZ 17**

| | |
|---|---|
| GP Commercial Designation<br>(based on breakdown below) | 40% Lt Industrial<br>60% Retail Low |

- **Marigold Plaza (Concept Plan #3)**

| | |
|---|---|
| Commercial Industrial<br>(10.7 acres) | 100% Lt Industrial |
| General Commercial<br>(16.9 acres*) | 30% Lt Industrial<br>70% Retail Low |
| Open Space<br>(2.6 acres) | N/A |

* A total of 33.2 acres of General Commercial shows on concept plan. 16.9 acres is removed to reflect approved Theme Park which will be included under "other" uses for traffic modelling purposes.

- **Redlands Research Park (SP 42, Captive Plastics)**

| | |
|---|---|
| Commercial Industrial | 100% Lt Industrial (approx 6.4 acres undeveloped) |

- **Undeveloped S of FC Channel**

| | |
|---|---|
| (20 acres) | 100% Retail Low<br>5% Retail Med |

**TAZ 18,19**

**Combined TAZ 18, 19**

| | |
|---|---|
| GP Commercial Assignment<br>(based on breakdown below) | 35% Office<br>20% Lt Industrial<br>45% Retail Low |

- **Centennial Commerce Park (SP 33, Orange Tree Lane)**

| | |
|---|---|
| Commercial<br>(8.25 Acres) | 100% Retail Low |
| Office/Industrial<br>(7.27 Acres) | 50% Industrial<br>50% Office |

- **East Valley Complex (SP 25, Orange Tree Lane)**

| | |
|---|---|
| Urban Svcs Commercial<br>(26.6 acres) | 100% Retail Low (approx 10.3 acres undeveloped) |
| Office/Industrial<br>(34.2 acres) | 70% Office (approx 10.9 acres undeveloped)<br>30% Lt Industrial (approx 5.9 acres undeveloped) |

- **Museum Complex (SP 29, Orange Tree Lane)**

N/A

6% reduction for future streets (collectors already shown)
10% vacancy factor
10% FAR adjustment (utility easements, freeway noise setbacks, lot inefficiencies, buffering)

### Commercial-Industrial Areas outside of East Valley Corridor

Commercial-Industrial areas located outside the East Valley Corridor are generally comprised of parcels with greater development constraints including smaller parcel size, irregular parcel layout, and the need for buffering of adjacent incompatible land use.

0% reduction for future streets
10% vacancy factor
10% FAR adjustment (lot inefficiencies)

### Downtown Redlands Specific Plan No. 45

For projection purposes, FARs typically found in commercial, industrial, and office projects recently approved within the City of Redlands were used. Other assumptions are listed following.

0% reduction for future streets
10% vacancy factor
10% FAR adjustment (lot inefficiencies)

## Residential Area Adjustments/Assumptions

### San Timoteo - Live Oak Canyon Areas

- **Southeast Area Plan**

This area is characterized by two principal types of terrain, the relatively flat valley floor (0-15% slope) and the sloping canyon walls/hillsides (0-30+% slope). On the valley floor, constraints consist of floodplain and assumed setbacks from the railroad tracks for noise purposes. The noise setback was identified at 100' on either side of the tracks in the Hidden River Country Club Estates DEIR. The amount of potentially developable acreage was reduced to account for these constraints before density factors were applied.

Aside from the valley floor, the majority of this area is characterized by hillside terrain. Consequently, based on discussions with City Staff, slope density assumptions were applied in determining residential buildout for these hillside areas. These are listed below. On parcels which had been previously subdivided but were vacant, an individual lot count method was utilized.

Finally, the projected General Plan buildout yield for this area was tested against the estimated unit yield found in the Southeast Area Plan (this unit yield was also based on a slope density formula) and found to be at the upper end of the SEAP estimate. Thus the General Plan buildout was deemed to be compatible with the Southeast Area Plan and appropriate as a "credible worst case" assessment of future development potential for this area.

| | |
|---|---|
| VLDR (Valley Floor) | assumes 2.1 du/ac on 0-15% slopes |
| VLDR (Hillside) | assumes 1 du/ac on 0-15% slopes and 1 du/3ac on 15-30% slopes |
| RC | assumes 1 du/10ac on 30+% slopes |
| RL | assumes 1 du/2.5ac on 0-15% slops and 1 du/5ac on 15-30% slopes |

- **San Timoteo Canyon Alessandro to Fern**

This area is outside the Southeast Area Plan but is similar in topographic character. Consequently, similar buildout yield assumptions were used.

| | |
|---|---|
| VLDR (Valley Floor) | assumes 2.1 du/ac on 0-15% slopes |
| VLDR (Hillside) | assumes 1 du/ac on 0-15% slopes and 1 du/3ac on 15-30% slopes |
| RC | assumes 1 du/10ac on slopes 30% and over |

- **San Timoteo Canyon Northwest of Fern**

This area consists of a broader, less constrained area than the other portions of San Timoteo Canyon. At this location, the height of the canyon walls is decreasing, the valley is broadening, and much of the area has been in agricultural cultivation. It is the opinion of the Planning staff that this area will develop toward the upper end of the VLDR density range at 2.7 du/ac once utilities such as sewer have been extended into the area. Individual parcel counts were utilized where appropriate to account for parcels previously subdivided to their maximum density.

VLDR assumes 2.7 du/ac on 0-15% slope and 1 du/3ac on 15-30% slopes

### Crafton-Mentone

This area is typified by land parcels subdivided for agricultural and citrus production which have more inefficiencies for layout as urban subdivisions due to their long, narrow shape and multiple ownership.

Prior residential subdivisions which have occurred in this area are typically smaller (as individual property owners convert from agricultural to urban uses) with lower densities than large master planned projects would achieve. Two prior tentative maps were reviewed corresponding to the LDR (Tract 12714 @ 3.5 du/ac) and to the VLDR (Tract 15304 @ 2.1 du/ac) designations to obtain achievable densities for the area. Consequently, a VLDR density below the maximum was selected for use in this area.

VLDR assumes 2.1 du/ac on 0-15% slopes
LDR assumes 3.5 du/ac on 0-15% slopes

**Proposed Residential Projects**

Whether approved or not, where major development projects have been proposed, project information was used in preference to a unit projection based on acreage and/or slope. This approach was selected since the project specific data was felt to be a closer representation of actual buildout. The following projects which have either been proposed or are in varying stages of the development process were required to provide slope density analysis to determine the allowable number of units.

- **Sterling on the Green (Marlborough Development)**, TAZ 60 - 610 single family units, this project is located in the City's Sphere of Influence adjacent to the Crafton Hills and is currently in the environmental review stage with San Bernardino County.

- **Sunset Hills**, TAZ 56 - 198 single family units, this project has been approved and is located within the City limits in San Timoteo Canyon.

- **Tract 14157**, TAZ 67 - 31 single family units, this project is approved and is located in the City's Sphere of Influence at the base of the Crafton Hills.

- **Specific Plan # 47 (Van Wieren)**, TAZ 59 - 24 single family units, this project is approved and is located within the City limits along the ridgetop overlooking Live Oak Canyon.

- **Hidden River Country Club Estates**, TAZ 53 - 134 single family units, this project is located in the City limits within San Timoteo Canyon and is currently in the environmental review stage.

**Mill Creek Unincorporated Area**

The Local Agency Formation Commission has not as yet determined whether to grant Sphere of Influence rights over this area of unincorporated County land to the City of Redlands or to the City of Highland. Before plans for the Seven Oaks Dam were formulated, the Sunrise Ranch project, a 2,800 unit residential community, was proposed for this area. The Sunrise Ranch project or one like it is still possible under the County's current Planned Development (PD) District in place over the property. Should Redlands be granted authority over this area and annexation were to occur in the future, the proposed General Plan calls for rural residential intensities in this area. The land use diagram applies the City's proposed Rural Living and Resource Conservation land use designations here.

## Qualifications Concerning Buildout Calculations

Projections of future growth and development are based on buildout calculations which are, in turn, based on the application of the buildout assumptions (as defined in this Appendix) to the land uses shown on the General Plan diagram. For some areas, the buildout calculations are based on specific development proposals, some of which have already received some level of City approval, and others of which are still preliminary.

Ultimately, the buildout calculations presented here represent a "credible worst case scenario" for buildout under the General Plan. On one hand, the buildout calculations are based on assumptions for residential intensities and floor area ratios that are somewhat lower than the maximum intensities legally possible under the General Plan. On the other hand, the buildout calculations assume full buildout of virtually all lands within the Planning Area. Ultimately these two sets of assumptions are likely to offset each other, resulting in a "credible worst case scenario".

The assumed residential intensities have not been adjusted and are representative of the maximum intensities legally possible under the General Plan. The assumed floor area ratios generally range from 71-76% of the maximum floor area ratios legally allowed under the General Plan. These assumptions are based on discussions with City Staff and reviews of similar General Plans in Northern and Southern California communities concerning intensities typical of what is likely to occur in Redlands under the General Plan. While, in any one instance, a development may exceed the intensity assumed in this Appendix, the buildout calculations assume that development will occur at the intensities described herein.

In establishing a "credible worst case scenario", another major consideration concerns the timing of full buildout. In the aggregate, the buildout calculations assume full buildout of every parcel within the City and depict major growth potential for Redlands in the residential, commercial, industrial, and office categories. Whether all of this potential development will actually occur during the projected timeframe of this General Plan (1995-2010) is speculative. For most land use categories, such as commercial, industrial, office, and residential, full buildout may not be realized for many years beyond the time frame of the General Plan. The development potential reflected in the buildout calculations is, nonetheless, theoretical development potential (based on the assumptions described herein) that would be created by 100% implementation of the plan and has been used as the basis of the impact assessment in this MEA/EIR document.

In practical terms, the combined assumptions of development at the legal maximum intensities and full buildout within the time frame of the General Plan would likely result in an overstatement of "effective" development potential and, in turn, lead to such problems as oversizing of infrastructure and underfunding infrastructure improvements.

## Commercial, Industrial, and Office Employment Assumptions

Employment projections for Commercial, Industrial, and Office uses are determined by applying typical employee generation rates to the square footage estimates developed for the General Plan buildout scenario. Generation rates are taken from SCAG's Draft "Consistency Guidelines for Transportation Modelling and Traffic Forecasting, Riverside and San Bernardino Counties."

| | |
|---|---|
| Commercial | 2.0 employees per thousand square feet of building |
| Industrial | 2.5 employees per thousand square feet of building |
| Office | 3.5 employees per thousand square feet of building |
| Hotel | 0.9 employees per thousand square feet of building |
| Schools | 0.107 employees per student |

Projected employees at buildout are listed as follows:

| | | |
|---|---|---|
| Commercial | 8,646.20 sq ft | 17,292 employees |
| Industrial | 21,641.99 sq ft | 54,105 employees |
| Office | 10,048 sq ft | 35,168 employees |
| Hotel | 316 rooms | 284 employees |
| Schools | 23,316 students | 2,495 employees |
| TOTAL | | 109,344 employees |

Using the same assumptions, 1994 employees are listed as follows:

| | | |
|---|---|---|
| Commercial | 3,099.31 sq ft | 6,199 employees |
| Industrial | 3,287.63 sq ft | 9,863 employees |
| Office | 2,437.75 sq ft | 8,532 employees |
| Hotel | 66 rooms | 60 employees |
| Schools | 17,098 students | 1,829 employees |
| TOTAL | | 26,483 employees |

Comparatively, the East Valley Corridor Specific Plan EIR (viewing buildout from the robust economy of the late 1980's) projects 90,000 jobs for the East Valley Corridor by the year 2028. SCAG socioeconomic projections (obtained January 1995) call for approximately 61,500 employees in the Planning Area by the year 2010 and 68,300 employees by the year 2015. Consequently, buildout of the General Plan is anticipated to occur well beyond these timeframes.

**Student Growth Assumptions**

Birth rate fluctuations make long range projections of school enrollment unreliable, but a best guess is essential because each site or major facilities decision must be made in a context of assumptions about future additions. Additional school sites on the General Plan Diagram are based on the following assumptions, derived from data in Redlands Unified School District (RUSD) Master Plan, 1990 and discussions with the RUSD in 1995.

1. Enrollment per housing unit is based on student generation factors provided by the RUSD, current as of mid-1995.

2. At the time the Redlands Planning Area reaches residential buildout the number of housing units in the District outside the Planning area will have increased by the same ratio as the number within the Planning Area. All facilities for students in grades 7-12 will be within the Planning Area.

3. The average capacity of elementary schools, junior high schools, and high schools will remain as it was in 1994. The averages include the capacity of year-round schools (YRS) as reported by the RUSD, 1994.

4. Grade groupings will be K-6, 7-8, and 9-12 to make the most efficient use of facilities, although enrollment shifts or educational policy could result in 7-9 and 10-12 groupings, as existing in 1994.

Nine K-6 schools with a total capacity of 7,863 (90 percent loading) serve the Planning Area, an average of 873 per site (see MEA Table 15.1). Elementary enrollment in 1993-94 was 6,476. Projected RUSD enrollment at buildout is 9,500 creating a deficit of 1,637 and requiring three additional schools. Sites shown on the General Plan Diagram are North Redlands (Judson Street site - owned), Greenspot, and San Timoteo Canyon.

All of the District's existing facilities for students in grades 7-12 are within the Planning Area. The two middle schools, Cope and Moore, (7-8) have a total capacity of 2,482 (90 percent utilization), an average of 1,241 per site (see MEA Table 15.2). Middle school enrollment in 1993-94 was 2,609. Projected enrollment at buildout is 3,546, leaving a deficit of 1,064.

Redlands High School (10-12) including the Freshman Campus (9) enrolled 4,081 students in 1993-94, above its 3,917 capacity (90 percent utilization). At buildout, projected enrollment in grades 10-12 is 4,942, using the same service area assumption as for the junior high schools, resulting in a deficit of 1,025 students. The second high school site shown on the General Plan Diagram at California Street and San Bernardino Avenue would provide additional capacity for approximately 2,500 students.

Based on the analysis above, with construction of the second high school and assuming the ability to adjust attendance boundaries appropriately, 7-12 grade schools would be slightly under capacity.

The General Plan Diagram designates sites to serve the K-6, 7-8, and 9-12 configuration, thus following current District policy, to be put into operation when the second high school opens.

Frequent review of school site needs will be essential as the choice of available sites narrows and as inevitable changes in enrollment ratios and educational policy occur.

**Student Growth Calculations**

Existing 1994 student enrollment for schools located within the Planning Area was provided by the Redlands Unified School District as follows:

| Facility | TAZ | 1994 Student Enrollment |
|---|---|---|
| Lugonia Elementary | TAZ 10 | 843 |
| Crafton Elementary | TAZ 27 | 977 |
| Franklin Elementary | TAZ 71 | 968 |
| Kingsbury Elementary | TAZ 47 | 856 |
| McKinley Elementary | TAZ 48 | 458 |
| Smiley Elementary | TAZ 51 | 640 |
| Kimberley Elementary | TAZ 55 | 546 |
| Mariposa Elementary | TAZ 58 | 583 |
| Mentone Elementary | TAZ 65 | 605 |
| TOTAL | | 6,476 total students |
| AVERAGE PER FACILITY | | 719 students per school |
| Moore Middle School | TAZ 28 | 1,309 |
| Cope Middle School | TAZ 49 | 1,300 |
| TOTAL | | 2,609 total students |
| Redlands Main Campus | TAZ 31 | 2,890 |
| Redlands Freshman Campus | TAZ 10 | 1,191 |
| | | 4,081 total students |

Student generation factors provided by Teri Shira of the Redlands Unified School District, Facilities Planning Division, on April 25, 1995 are listed as follows:

| | | |
|---|---|---|
| SFR | Elem (K-6) | .3114 students/du |
| | Middle (7-9) | .1172 students/du |
| | HS (10-12) | .1090 students/du |
| MFR | Elem (K-6) | .1733 students/du |
| | Middle (7-9) | .0600 students/du |
| | HS (10-12) | .0480 students/du |
| MH | Elem (K-6) | .1475 students/du |
| | Middle (7-9) | .0527 students/du |
| | HS (10-12) | .1539 students/du |

Applying these factors to projected residential units yields the following incremental increase in students between 1994 and General Plan Buildout generated within the Planning Area:

**Incremental RUSD Student Increase: 1994 to Buildout**

| Units | Elementary | Mid School | High School |
|---|---|---|---|
| 6,418 SFR Units | 1,999 | 752 | 700 |
| 2,976 MFR Units | 516 | 179 | 143 |
| 114 MH Units | 17 | 6 | 18 |
| 9,508 Units | 2,532 | 937 | 861 |

Applying these factors to projected residential units yields the following total students at General Plan Buildout generated within the Planning Area:

**Total RUSD Students generated within Planning Area at Buildout**

| Units | Elementary | Mid School | High School |
|---|---|---|---|
| 23,593 SFR Units | 7,347 | 2,765 | 2,572 |
| 11,362 MFR Units | 1,969 | 681 | 545 |
| 1,459 MH Units | 215 | 76 | 224 |
| 36,414 Units | 9,513 | 3,522 | 3,341 |

In order to confirm final student counts, the following comparison was performed. First, the total students were calculated using buildout figures only (as shown in the table above). These were then compared with the incremental student increase added to the 1994 existing student enrollment. This second method of computation allows the inclusion of students generated outside the Planning Area from surrounding communities. In general, the comparison indicates that elementary and middle school students are primarily generated from the local area but that a notable portion of High School students attend from outside of the area. Consequently, the higher Middle and High School figures are used to calculate buildout totals.

**Total Students generated within Planning Area at Buildout**

| Units | Elementary | Mid School | High School |
|---|---|---|---|
| Planning Area Generated (Calculated on Final Unit Count) | 9,513 | 3,522 | 3,341 |
| Attendance Generated (Calculated on Increment + 1994 Enrollment) | 9,008 | 3,546 | 4,942 |

# CITY OF REDLANDS

## General Plan Update

## Traffic Study Technical Report

prepared by

*DKS Associates*

August 2, 1995

# Contents


1. INTRODUCTION . . . . . . . . . . 1

    Scope of Work . . . . . . . . . . 1

2. TRANSPORTATION SETTING . . . . . . . . . . 2

    Existing Street System . . . . . . . . . . 2
    Existing Traffic Volumes . . . . . . . . . . 4
    Existing Roadway Levels of Service . . . . . . . . . . 5
    Assessment of Existing Circulation Conditions . . . . . . . . . . 5
    Transit Services . . . . . . . . . . 7
    Truck Routes . . . . . . . . . . 8
    Bicycle Routes . . . . . . . . . . 8
    Redlands Airport . . . . . . . . . . 9
    Railroads . . . . . . . . . . 9
    Programmed and Planned Improvements . . . . . . . . . . 10
        Programmed Local Street Improvements . . . . . . . . . . 10
        Programmed Freeway Improvements . . . . . . . . . . 10
        Regional Mobility Plan . . . . . . . . . . 10
        Commuter Rail Service Plans . . . . . . . . . . 11
        Congestion Management Program . . . . . . . . . . 12
        North-South Transportation Corridor Study . . . . . . . . . . 13

3. TRAFFIC FORECAST MODEL . . . . . . . . . . 14

    Traffic Model Description . . . . . . . . . . 14
        Model Steps . . . . . . . . . . 14
        Model Area and Traffic Analysis Zones . . . . . . . . . . 16
        Roadway Network . . . . . . . . . . 16
        Land Uses . . . . . . . . . . 19
        Regional Travel Estimation . . . . . . . . . . 19
        Trip Generation . . . . . . . . . . 20
        Trip Distribution . . . . . . . . . . 20
        Traffic Assignment . . . . . . . . . . 20
    Base Year Model Validation . . . . . . . . . . 21
    CMP Model Interface . . . . . . . . . . 24

4. PROPOSED CIRCULATION ELEMENT . . . . . . . . . . 26

    Plan Development Process . . . . . . . . . . 26

## Contents (Continued)

4. PROPOSED CIRCULATION ELEMENT (Continued)

Street Network and Classification . . . 27
Functional Classification System . . . 27
Freeways . . . 27
Major Arterials . . . 29
Minor Arterials . . . 29
Collectors . . . 30
Local Streets . . . 32
Traffic Service Level Standards . . . 32
Arterials . . . 32
Collector and Local Streets . . . 32
Intersections . . . 33
Street Design Standards . . . 33
Arterial Frontage Access . . . 35
Bicycle And Pedestrian Circulation . . . 36
Bicycle Routes . . . 36
Other Bicycle Facilities . . . 38
Pedestrian Facilities . . . 38
Travel Demand Management . . . 38
Public Transit . . . 42
Congestion Management Program . . . 42
Regional Services . . . 42
Local Routes . . . 42
Growth Outside The Planning Area . . . 43
Capital Improvements . . . 43

5. TRANSPORTATION IMPACTS OF THE PLAN . . . 47

Travel Forecasts . . . 47
Land Uses . . . 47
Trip Generation . . . 48
Projected Traffic Volumes . . . 49
Future Levels of Service . . . 51

## Contents (Continued)

5. TRANSPORTATION IMPACTS OF THE PLAN (Continued)

Analysis of General Plan Traffic Impacts . . . . . . . . . . . . . . . . . . . . . . . . 55
Arterial System . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 56
Collector Streets . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 58
Freeway Impacts . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 59
Estimated Improvement Costs . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 60
TDM/Transit Impacts . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 61

## Figures

1. Existing Street System and Traffic Volumes (1980-87) . . . . . . . . . . . . . . . . . 3

2. Traffic Model Process . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 15

3. Modeling Area . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 17

4. Traffic Analysis Zones . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 18

5. Validation Screenlines . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 23

6. Proposed Circulation Network . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 28

7. Proposed Street Widths . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 34

8. Bicycle Route Plan . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 37

9. Existing/Projected Daily Traffic Volumes (two-way in thousands) . . . . . . . . . . 50

10. Projected Level of Service Deficiencies . . . . . . . . . . . . . . . . . . . . . . . 52

## Tables

1. Level of Service Definitions . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 6

2. Redlands Trip Generation Rates . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 21

3. Model Validation Results by Screenline . . . . . . . . . . . . . . . . . . . . . . . . . . . . 24

4. Travel Demand Strategies . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 40

5. Proposed Roadway Capital Improvements . . . . . . . . . . . . . . . . . . . . . . . . . . 44

6. Land Use Summary - Existing vs. Build-Out . . . . . . . . . . . . . . . . . . . . . . . . 48

7. Comparison of Existing and Build-Out Future Trip Generation
Daily Vehicle Trip Ends . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 49

8. Arterial System Volumes and Levels of Service . . . . . . . . . . . . . . . . . . . . . . . 53

9. Freeway Volumes and Levels of Service . . . . . . . . . . . . . . . . . . . . . . . . . . . . 55

10. Redlands General Plan -- Cost of Improvements . . . . . . . . . . . . . . . . . . . . . . 60

# 1. Introduction

# 1. Introduction

This report describes the technical analyses, results and recommendations of a traffic study carried out in conjunction with the development of a General Plan for the City of Redlands. The purpose of the traffic study was to evaluate long-range traffic needs and opportunities within the City's Planning Area and, from this, to develop the Circulation Element of the General Plan. The traffic study also provides inputs to the General Plan EIR. The study was undertaken by DKS Associates under the direction of Blayney-Dyett-Greenberg (General Plan consultants 1988-1992), Smith, Peroni and Fox (General Plan consultants 1994-1995) and the City of Redlands.

This Technical Report was first prepared in December 1991, documenting future needs and impacts of the draft General Plan. Following City Council revisions to the Land Use Element in 1993 and 1995, transportation impacts were re-evaluated and Chapter 5 of the Technical Report was revised to address those impacts. Other sections of the report have been updated from the December 1991 draft version.

## SCOPE OF WORK

The overall work program for the traffic study consisted of five work tasks designed to accomplish the study objectives:

- Inventory of existing transportation data and conditions.
- Formulation of a computer traffic forecast model to test traffic implications and needs of land use alternatives.
- Evaluation of existing General Plan policies at buildout.
- Evaluation of General Plan alternatives.
- Recommendation of a circulation element for incorporation into the City's General Plan

# 2. Transportation Setting

## 2. Transportation Setting

To gain an understanding of existing travel patterns and conditions, all key aspects of transportation in Redlands were inventoried for this study during 1988 and updated in 1995. The following sections describe the roadway network, traffic volumes, levels of service, transit services and bicycle routes at that time.

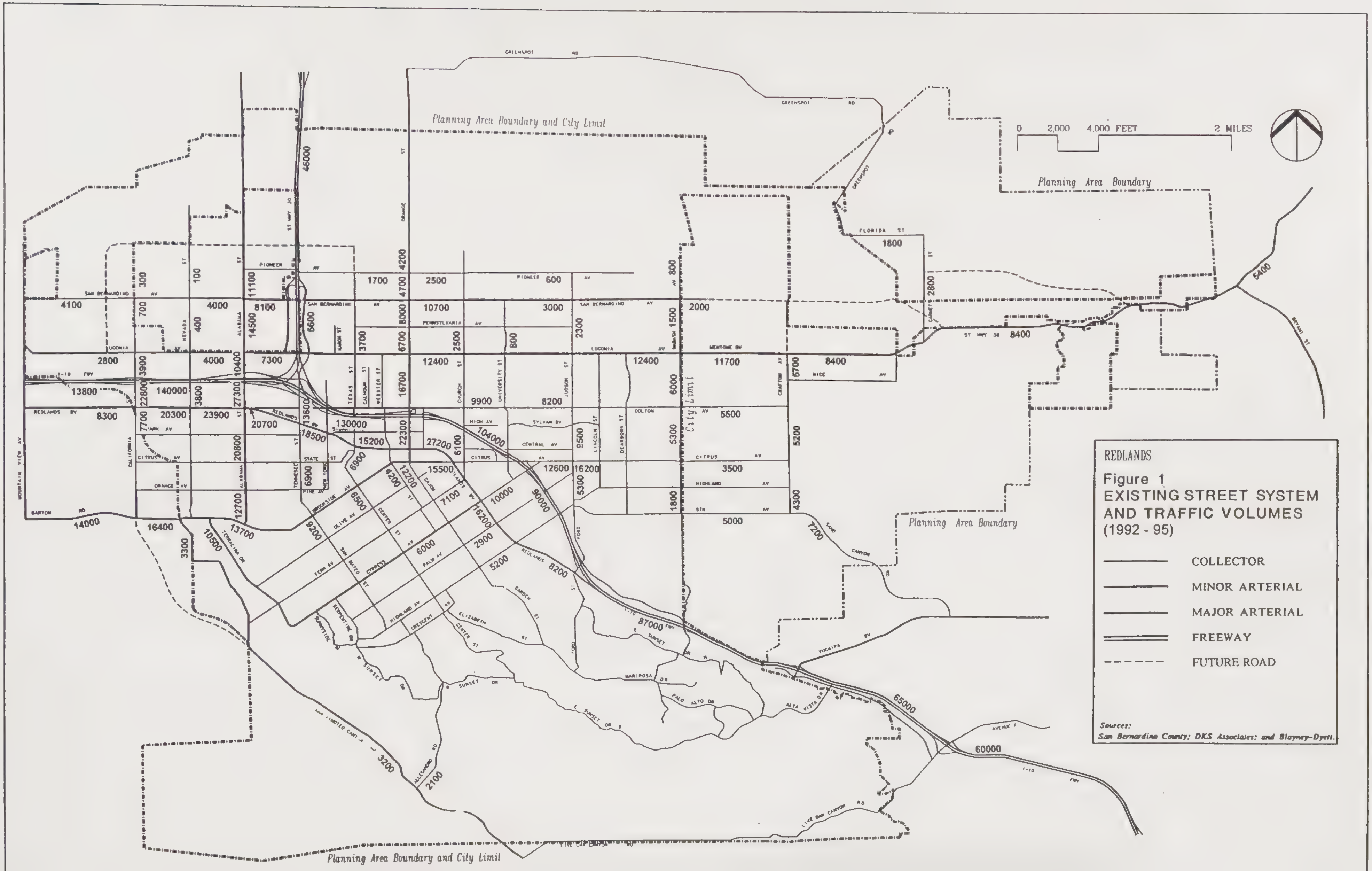
### EXISTING STREET SYSTEM

The existing (1995) network of major roadways serving Redlands is shown in Figure 1. Redlands has a north-south, east-west grid street pattern north of Interstate 10 (I-10) freeway. South of I-10 a grid pattern continues in the gently sloping area, but at approximately a 33-degree angle to the grid north of I-10. Further south, as the slopes increase, streets follow the natural terrain. The street system is broken by three significant barriers: I-10, the Santa Ana Wash, and hills in the southeastern part of the city. Street connections are limited across the Santa Ana Wash to the north and the hills to the south. These natural and man-made barriers limit the quality of the circulation system.

The current (1972) General Plan map designates freeways, major highways, secondary highways, collector streets, and scenic routes. Interstate 10 and State Route (SR) 30 are the only freeways within Redlands. Interstate 10 is 6 to 8 lanes wide through Redlands, while SR 30 is 4 lanes wide.

The "highways" categories correspond to the San Bernardino County General Plan system, but most of the designated routes in Redlands are designed and used as arterial streets. Highways are separated into either major highways (100 foot right-of-way) or secondary highways (88 foot right-of-way). Major highways designated on the 1972 General Plan include:

- Alabama Street
- Redlands Boulevard


REDLANDS
Figure 1
EXISTING STREET SYSTEM AND TRAFFIC VOLUMES
(1992 - 95)
COLLECTOR
MINOR ARTERIAL
MAJOR ARTERIAL
FREEWAY
FUTURE ROAD
Sources:
San Bernardino County; DKS Associates; and Blayney-Dyett.
0 2,000 4,000 FEET 2 MILES
Planning Area Boundary and City Limit
Planning Area Boundary
City Limit

- Barton Road/Brookside Avenue
- Lugonia Avenue east of Orange Street
- Terracina Avenue
- most of Cypress Avenue
- Crafton Avenue/Sand Canyon Road
- San Timoteo Canyon Road

Secondary highways designated on the 1972 General Plan include:

- San Bernardino Avenue
- Lugonia Avenue west of Orange Street
- Colton Avenue
- Citrus Avenue
- California Street
- Texas Street
- Orange Street
- Church Street
- University Street
- Dearborn Street

The remaining streets in Redlands are designated as either collector streets, which collect traffic from residential and commercial areas and channel it to arterials, or as local streets, which have the sole function of providing access to adjoining land uses. These are designed for lower speed, and are typically only two lanes wide.

Most of the streets in the hillside area of Redlands are designated as collector streets. The 1972 General Plan recommends that "streets in hillside areas conform to special standards which permit variation in right-of-way width in areas or along sections of the road where conformance with the typical standards is not feasible because of topography."

At present, numerous streets in Redlands are rural roads or highways. This refers to the nature of adjoining uses and/or design, rather than function of the route. Rural roads may function as local, collector or arterial streets.

## EXISTING TRAFFIC VOLUMES

The average daily traffic (ADT) volume often identifies the classification of a street or denotes a problem with higher volumes than expected on a certain street. Redlands currently (as of 1995) has no streets, other than freeways, that carry over 24,000 vehicles on an average day. Redlands Boulevard west of Alabama Street has an ADT of 24,000, the highest traffic volume in the City. I-10 carries approximately 140,000 vehicles per day at Alabama Street and approximately 104,000 east of University Street. State Route 30 carries

approximately 46,000 ADT north of I-10. Figure 1 shows the volumes on streets carrying more than 5,000 ADT.

## EXISTING ROADWAY LEVELS OF SERVICE

Traffic flows provide an understanding of the general nature of travel in an area but do not indicate the street network's quality of service to motorists nor its ability to carry additional traffic in the future. For this reason, the concept of level of service (LOS) has been developed to rate the quality of traffic flow. Level of Service grades range from A to F, with A the best and F the worst (Table 1).

- **LOS A, B** and **C** indicate satisfactory conditions where traffic can move relatively freely.

- **LOS D** describes conditions where delay is more noticeable; average travel speeds may be as low as 40 percent of the free flow speed. LOS D is marginally unacceptable, although many urban communities are now accepting LOS D as the minimum acceptable condition for peak hours.

- **LOS E** indicates unacceptable conditions with significant delays and average travel speeds of one-third the free flow speed or lower; traffic volumes are at or close to capacity.

- **LOS F** characterizes flow at very slow speeds (stop-and-go), and large delays (over a minute) and queuing at signalized intersections; the traffic demand effectively exceeds the roadway's capacity over the entire hour. LOS F is clearly an unacceptable traffic condition.

The level of service of a particular roadway segment is determined by comparing the daily traffic volume to the estimated capacity of the roadway; the higher the ratio of volume to capacity, the poorer the level of service.

It should be noted that, while daily traffic volumes and capacities are used for measuring LOS, the ratings refer to peak hours of the day (typically commute hours). During other hours, better LOS would usually prevail.

## ASSESSMENT OF EXISTING CIRCULATION CONDITIONS

Generally, transportation conditions in Redlands are fairly good in comparison to larger urban areas in the region. Local residents can travel across town in ten minutes or less, and there are few locations (other than on I-10 freeway) where the traffic volume exceeds 15,000

**Table 1**
**Level of Service Definitions**

| Level of Service | Volume-to-Capacity Ratio | Definition |
|---|---|---|
| LOS A | 0 to 0.34 | Conditions of free flow; speed is controlled by driver's desires, speed limits, or physical roadway conditions. |
| LOS B | 0.35 to 0.50 | Conditions of stable flow; operating speeds beginning to be restricted; little or no restrictions on maneuverability from other vehicles. |
| LOS C | 0.51 to 0.74 | Conditions of stable flow; speeds and maneuverability more closely restricted; occasional backups behind left-turning vehicles at intersections. |
| LOS D | 0.75 to 0.89 | Conditions approach unstable flow; tolerable speeds can be maintained but temporary restrictions may cause extensive delays; little freedom to maneuver; comfort and convenience low; at intersection, some motorists, especially those making left turns, may wait through one or more signal changes. |
| LOS E | 0.90 to 0.99 | Conditions approach capacity; unstable flow with stoppages of momentary duration; maneuverability severely limited. |
| LOS F | 1.00 or > | Forced flow conditions; stoppages for long periods; low operating speeds. |

Source: DKS Associates.

vehicles per day. Good traffic operations prevail during the peak periods throughout most of the planning area. Isolated delays occur along some corridors where traffic converges and some localized congestion can occur for short periods (typically 15 minutes or less) within the peak hour. Also, traffic volumes on some residential streets are at or near the limits of acceptability for residentially fronted streets.

The most serious problems appear to be at the intersections of:

- Alabama Street and Redlands Boulevard
- Alabama Street and San Bernardino Avenue
- Redlands Boulevard and Orange Street

At the Tennessee/Colton intersection, a new signal phase was recently added to improve the intersection's traffic operations by separating left turns from through traffic on all approaches. This intersection is now operating satisfactorily.

## TRANSIT SERVICES

Local and intercity public transit is provided by Omnitrans. Currently, three regional lines connect Redlands with other cities in San Bernardino County, and a fourth line circulates within Redlands (as of April, 1995).

- **Route 14** (Yucaipa-Fontana) travels east-west through the south-central part of Redlands, connecting Yucaipa, Redlands, Loma Linda, San Bernardino, Rialto, and Fontana. Hourly service is provided from 6:00 A.M. to 8:00 P.M. on weekdays, 7:00 A.M. to 7:45 P.M. on Saturdays, and 8:30 A.M. to 5:30 P.M. on Sundays.

- **Route 17** (San Bernardino-Redlands) travels from Central City mall in San Bernardino through the central part of Redlands, serving the industrial park area and terminating at the Redlands Mall. It runs on 45-minute headways from about 6:00 A.M. to 10:00 P.M. on weekdays, with reduced hours of service on Saturdays and Sundays.

- **Route 32** (Redlands-Highland) connects the cities of Highland, San Bernardino, and Redlands, terminating at Redlands Mall. Route 32 serves the west part of Redlands, south of I-10, running on 60-minute headways from about 6:00 A.M. to 7:00 P.M. on weekdays and on Saturdays.

- **Route 30** circulates in a one-way loop in the north-central part of Redlands, serving the University of Redlands, and providing transfers to other Omnitrans routes at Redlands Mall. Hourly service is provided from 5:16 A.M. to 7:00 P.M. weekdays; service is increased to 45 minutes on Saturdays between 7:15 A.M. and 6:00 P.M., and between 8:20 A.M. and 5:42 P.M. on Sundays.

Omnitrans also operates five vans that provide door-to-door service over 98 percent of Redlands. This dial-a-ride service is primarily for seniors and handicapped citizens, but can be used by anyone.

Local transit does not appear to accommodate a large percentage of either total daily or peak-hour travel in Redlands. Transit in high density suburban areas can often account for up to 5 to 10 percent of all peak hour trips and on the order of 1 to 1.5 percent of all daily trips. The existing levels of transit service and density of development within Redlands are not sufficient to achieve these shares.

## TRUCK ROUTES

Redlands has adopted a truck route plan and system that designates certain streets for movement of vehicles exceeding a gross weight of five tons (City Council Resolution No. 4587, December 1989). The following streets are designated as truck routes:

| Street | Limits |
|---|---|
| Alabama Street | Barton Road to north city limits |
| Barton Road | West city limits to Alabama Street |
| Redlands Boulevard | Total length within city limits |
| San Timoteo Canyon Road | Total length within city limits |
| San Bernardino Avenue | Route 30 to Orange Street |
| Orange Street | Lugonia Avenue to north city limits |
| Colton Avenue | Redlands Boulevard to Calhoun Street |
| Center Street | Cypress Avenue to Redlands Boulevard |
| Tennessee Street | San Mateo Street to Colton Avenue |
| San Mateo Street | Cypress Avenue to Tennessee Street |
| Cypress Avenue | San Mateo Street to Citrus Avenue |
| Citrus Avenue | Redlands Boulevard to Wabash Avenue |
| Fifth Avenue | Ford Street to Wabash Avenue |
| Ford Street | Fifth Avenue to Citrus Avenue |

## BICYCLE ROUTES

Bicycle use can be made safer and more popular by the designation of bike routes indicated by signs on streets (Class 3), bike lanes striped on streets (Class 2), or bike paths separated from automobile traffic (Class 1). The only existing bike path is in the vicinity of Ginny Davis Park. The Redlands Department of Public Works has prepared a draft Bicycle Master Plan that is now being reviewed and is anticipated to be adopted in early 1996. The Master Plan proposes a comprehensive network of bicycle paths, lanes, and signed routes, and standards for their implementation.

## REDLANDS AIRPORT

The Redlands Municipal Airport, located along the bluff adjoining the Santa Ana Wash between Judson Street to the west and Wabash Avenue to the east, is a city-owned general aviation facility. Regularly scheduled passenger service is not envisioned. As of 1991, roughly 230 planes were based at the airport, and there were about 65,000 flights per year.

The 1993 *Redlands Municipal Airport Master Plan* projected an increase in average daily aircraft operations from 178 in 1991 to 186 in 1995 and 209 in 2000. However, increases in demand for general aviation facilities have been lower than projected. A federal grant was received in 1988 to expand the south apron to accommodate another 250 planes. Based upon a state forecast of a 10 percent increase in demand over the next 10 to 15 years, the airport will not need more than the 500 aircraft parking spaces currently planned, but East Valley Corridor development could cause faster growth.

The projected area of noise impact, as defined by the Community Noise Equivalent Level (CNEL) 65 Db contour, within which single-family residential development is generally considered unacceptable, extends 400 feet west of Judson Street and east to a point 2,200 feet east of Wabash Avenue in the year 2000. No homes exist within this area. The Redlands City Council requires dedication of an aviation easement as a condition of development approval for projects within one mile of the projected CNEL 65 Db contour.

## RAILROADS

Both Atchison, Topeka, and Santa Fee (AT&SF), and Southern Pacific (SP) railroad companies operate freight lines in the Redlands area. The AT&SF used to run a local service freight line from San Bernardino to Mentone. On the average, one train makes the round trip six days a week. AT&SF, however, has recently sold the line to Metro-Link. Contrary to expectations in the Park and Open Space Plan, AT&SF believes Metro-Link will not abandon the line, but continue to operate it at the same level of service. It is anticipated that in the relatively near future, Metro-Link will extend their commuter service to Redlands via this existing rail line.

Southern Pacific has two lines in the area. The first is an abandoned spur which runs from Bryn Mawr through Redlands to Mentone. Some of this track was sold to AT&SF; the rest has been dismantled. SP still owns the land, but has no plans for it. The second line is SP's double-track, main transcontinental freight line, which runs through San Timoteo Canyon to the west. It is estimated that 40 trains use this track every day. SP has no plans for expansion or further reduction.

## PROGRAMMED AND PLANNED IMPROVEMENTS

### Programmed Local Street Improvements

The City's Five-Year Transportation Improvement Plan (as of 1994) includes:

- Traffic signal at Redlands Boulevard and Nevada Street
- Traffic signal at Redlands Boulevard and New Jersey Street
- Reconstruction of Citrus Avenue, Orange Street to Redlands Boulevard
- Widen and upgrade RR crossing, California Street at Railroad
- Realignment of street intersection, University Street and Colton Avenue.
- Construct new street, Wabash Avenue — I-10 to Fifth Avenue.
- Intersection improvements, Wabash Avenue and Colton Avenue.
- Traffic signal at Cajon Street and Cypress Avenue
- Reconstruct and widen Citrus Avenue to Wabash Avenue.

**Funding.** Prior to 1993, sources of funding used to accomplish projects identified in the Five-Year Transportation Improvement Programs (TIP) were typically the Transportation Development Act (TDA), Article 8 gas tax funds, and the Federal Urban Aid (FAU) funding. However, since 1993, the city no longer receives this type of funding and has to primarily rely on Development Impact Fees, Measure I (sales tax) funds, and Partnership Funds (SANBAG) to accomplish the current and future Five-Year Development Improvement Programs.

Traffic signalization fees and street improvement fees for new residential, commercial and industrial development became effective in 1994. These fees will help fund street and signal improvements in the traffic improvement plan and long-range improvements, which are estimated to cost approximately $3,605,000 in 1994 dollars.

### Programmed Freeway Improvements

Caltrans has recently completed State Route 30 as a four-lane freeway connecting I-10 in Redlands with I-215 in San Bernardino. The current State Transportation Improvement Program (STIP) does not include any new facilities or capacity improvements in the Redlands area.

### Regional Mobility Plan

SCAG's 1993 *Regional Mobility Plan* serves as the Federal and State required Regional Transportation Plan, identifying policies and actions to address the region's mobility issues over the next 20 years. Projects in the region's Transportation Improvement Program must be consistent with the Regional Mobility Plan. The Plan recognizes that the automobile will continue as the region's primary mode of travel, but also that existing streets and highways

cannot accommodate the additional traffic implied by the growth projections. Therefore, the Plan emphasizes alternatives to freeway and street widening such as travel demand management and transit improvements.

The *Facilities Improvements* component incorporates programmed widening of I-10 between I-215 and SR 30. In keeping with the Plan's emphasis, no other freeway improvements in the Redlands vicinity are envisioned in the 20-year horizon. No high occupancy vehicle lanes are included in these improvements.

The *High Occupancy Vehicle (HOV) Program* provides for an extensive system of HOV lanes in the region. No HOV facilities are envisioned in the Redlands area, but HOV lanes are proposed to be added to I-10 freeway as far east as I-215; the eastern segment between I-15 and I-215 would depend upon finding additional sources of revenue, however.

The *Transit Program* of the Plan encompasses line haul, feeder and local transit services. A total of 25 medium and high capacity transit corridors are identified. Although I-10 from I-215 through Redlands to Banning is identified as a potential transit corridor, no medium or high capacity transit services are envisioned within Redlands in the Plan. Commuter and intercity rail services are proposed in the Los Angeles-San Bernardino and the Anaheim-San Bernardino corridors, but no commuter rail services are proposed into Redlands in the Plan. Metro-Link is planning to provide commuter service from San Bernardino to Redlands in late 1995 or early 1996.

It should be noted that the Regional Mobility Plan addresses a 20-year planning period, and does not reflect buildout of the Redlands Planning Area as assumed in the General Plan.

**Commuter Rail Service Plans**

The Southern California Regional Rail Authority has been formed to implement and operate commuter rail services in the region. Current plans include the following:

- **Los Angeles - San Bernardino.** This line started operating in the fall of 1992. It operates from Los Angeles through Ontario, Montclair and other cities, terminating in San Bernardino at the 4th Street Amtrak station just west of I-215. Current operation consists of nine trains each way daily.

- **San Bernardino/Riverside - Irvine.** This line, which would also extend to Los Angeles, is anticipated to start up in October, 1995.

- **San Bernardino - Redlands.** This line would be an 8-mile eastward extension from the 4th Street Amtrak station in central San Bernardino along the AT&SF trackage into and through Redlands. (This corridor is not identified in SCAG's Regional

Mobility Plan.) It is not expected to operate until some time after 1995, and is subject to an agreement for purchase of railroad right-of-way. Stations would be located in Redlands at California, Orange and Mentone.

**Congestion Management Program**

Proposition 111, passed in June, 1990, established requirements for each urbanized county to develop and update annually a Congestion Management Program (CMP). The intent of the CMP is to address transportation needs through coordinated and comprehensive approaches. In San Bernardino County, the San Bernardino Association of Governments is the agency designated to establish the CMP. CMP elements are as follows:

- Level of service standards for designated key routes in the county.
- Transit route/frequency/coordination standards.
- A trip reduction and travel demand element to promote alternative travel methods, jobs-housing balance, and other strategies to reduce peak traffic.
- A program to analyze impacts of land use decisions by local jurisdictions.
- A seven-year capital improvement program to support the other elements.

Key features of the CMP (November 4, 1992) for San Bernardino County include the following:

- Designation of I-10 freeway, Route 30 freeway, Redlands Boulevard, Barton/Brookside/Citrus, California Street, Alabama Street, and Orange Street as CMP routes subject to LOS standards.
- Establishment of LOS E or the current level, whichever is farther from LOS A, as the minimum standard in urbanized areas (LOS D in rural areas).
- Transit service standards to guide future improvements in major travel corridors, including those currently planned for future commuter rail services (see above) as well as the Redlands-Highland corridor, among others.
- Requirements for local jurisdictions to adopt and implement trip reduction ordinances. The proposed Circulation Element of the General Plan (see Chapter 4) includes this provision. The travel demand management ordinance was adopted in 1993 to reduce peak hour traffic.

**North-South Transportation Corridor Study**

The San Bernardino Association of Governments sponsored a consultant study of north-south transportation needs and alternatives linking the Moreno and San Jacinto Valleys in Riverside County with the East Valley area of San Bernardino County. The study area is bounded by I-10 on the north and east, Route 60 on the south and I-215 on the west. The purpose of the study is to identify a preferred alternative based upon facility needs, environmental constraints and engineering/planning criteria. Riverside County, San Bernardino County and affected cities (including Redlands) are participating in the study.

The first phase of the North-South Transportation Corridor Study will project 2010 traffic volumes. The second phase of the study will evaluate and recommend improvements in the corridor. The study has been placed on hold pending additional funding.

One of the alternative route segments being studied includes San Timoteo Canyon Road. Therefore, depending on the results of this study, it may be necessary to review the General Plan Circulation Element at that time.

# 3. Traffic Forecast Model

# 3. Traffic Forecast Model

The need for future transportation improvements within Redlands will depend upon the extent and locations of future growth. A traffic forecast model was developed for the city which translates land uses into roadway volume projections. This is the basis for identifying potential future roadway deficiencies and for evaluating alternative circulation improvements. This chapter describes the model and its validation. Application of the model to assess potential future circulation needs and deficiencies is described in the next chapter of this report.

## TRAFFIC MODEL DESCRIPTION

The traffic forecast model is a means to project future traffic levels on individual streets based upon forecasted land uses and a description of the roadway system. The model is validated by testing its ability to replicate existing conditions given the existing land uses and roads.

The Redlands model operates on a microcomputer using the TRANPLAN software system, the same software used by the Southern California Association of Governments (SCAG) for the Riverside San Bernardino Area Comprehensive Transportation Plan (CTP) model. The assumptions for travel outside of Redlands are derived directly from the CTP model, as described below.

### Model Steps

The general process and inputs and outputs for the Redlands traffic forecast model are shown in Figure 2. The process involves the following key steps which are done in sequence:

- **Trip Generation.** The trip generation step translates land use quantities for each geographic area (traffic analysis zone) into vehicle trips starting or ending in the zone.

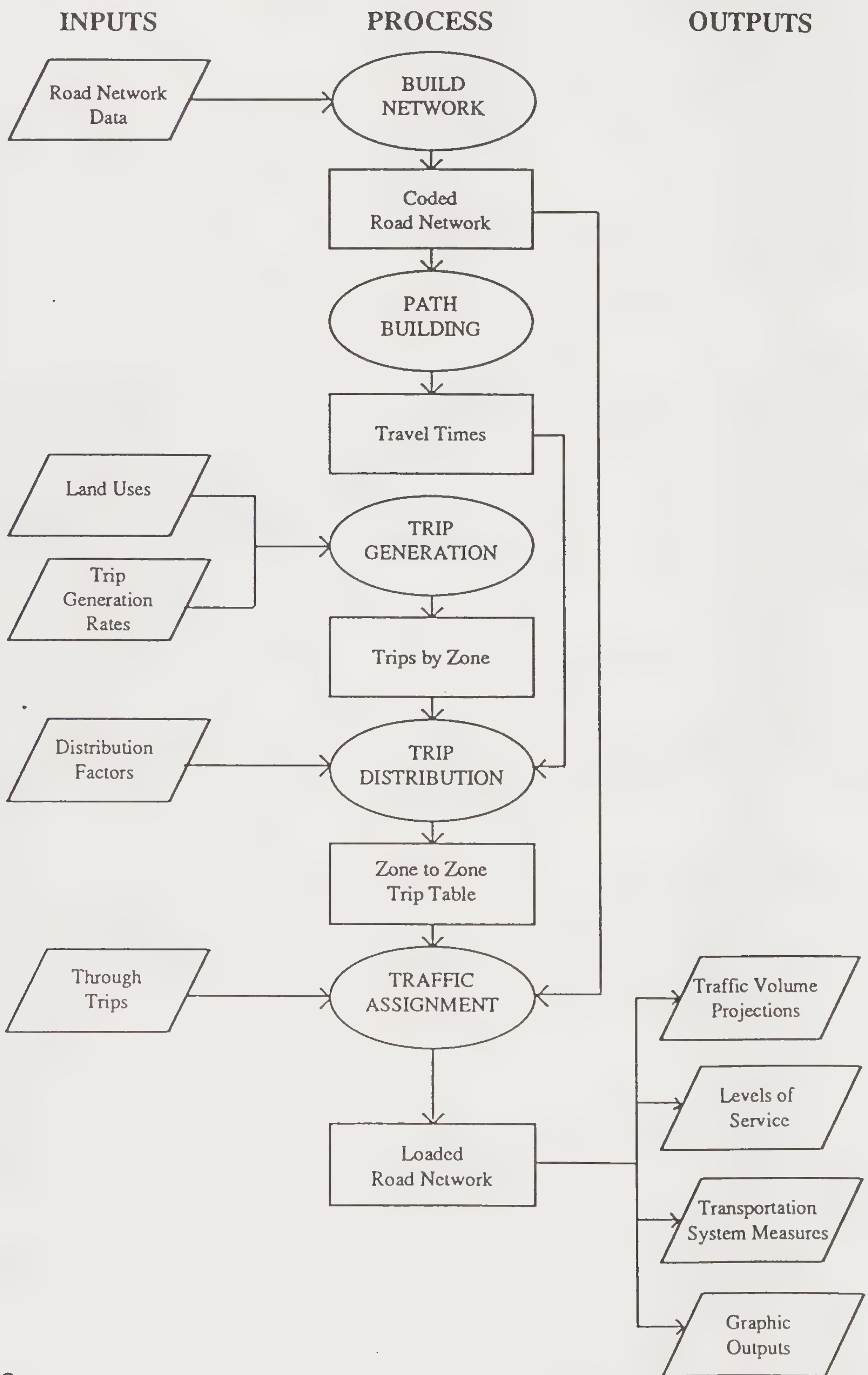



Figure 2
TRAFFIC MODEL PROCESS

- **Trip Distribution.** This step estimates how many of the generated trips travel from one zone to any other zone.

- **Traffic Assignment.** In this step, trips from each origin zone to each destination zone are assigned to specific travel routes in the roadway network.

Transportation models sometimes also include a mode choice step to estimate the proportion of total person trips which use transit and carpooling as opposed to single occupant vehicles. The Redlands model combines the trip generation and mode choice steps, so that trip generation estimates account for vehicle trips directly. In essence, existing rates of transit use (which are a very low proportion of travel) and ridesharing are built into the model and are assumed to prevail in the future.

**Model Area and Traffic Analysis Zones**

For traffic forecasting, the study area goes well beyond the Redlands Planning Area. The model extends from I-215/San Bernardino on the north and west to Route 60/Beaumont on the south and east (Figure 3).

The model area is divided into geographical zones called traffic analysis zones that represent sources of vehicle trip generation. Land use data are aggregated into these zones. There are 72 zones within the Redlands Planning Area (Figure 4).

In addition to the Redlands zones, 57 "buffer area" zones have been defined to represent travel choices between Redlands and nearby areas. The "buffer area" includes parts of Highland, San Bernardino, Loma Linda, Yucaipa and Beaumont. These zones are at a coarser level of detail than in the Redlands Planning area. The buffer area zones each respresent one or more specific CTP model zones.

Finally, "gateway" zones are defined to represent origins and destinations of external trips that pass through or start or end in the model area. These are defined for 15 primary routes into and out of the study area, including I-10 East and West, I-215 North and South, SR 60 West, Routes 330 and 38 to the north, and various other arterial highways. The gateway zones are listed in Table 7 in Appendix B.

**Roadway Network**

A key input to the traffic forecasting process is a computer representation of the roadway network. This is used to estimate travel times between each pair of zones in the study area, as well as for assigning resulting vehicle trips.

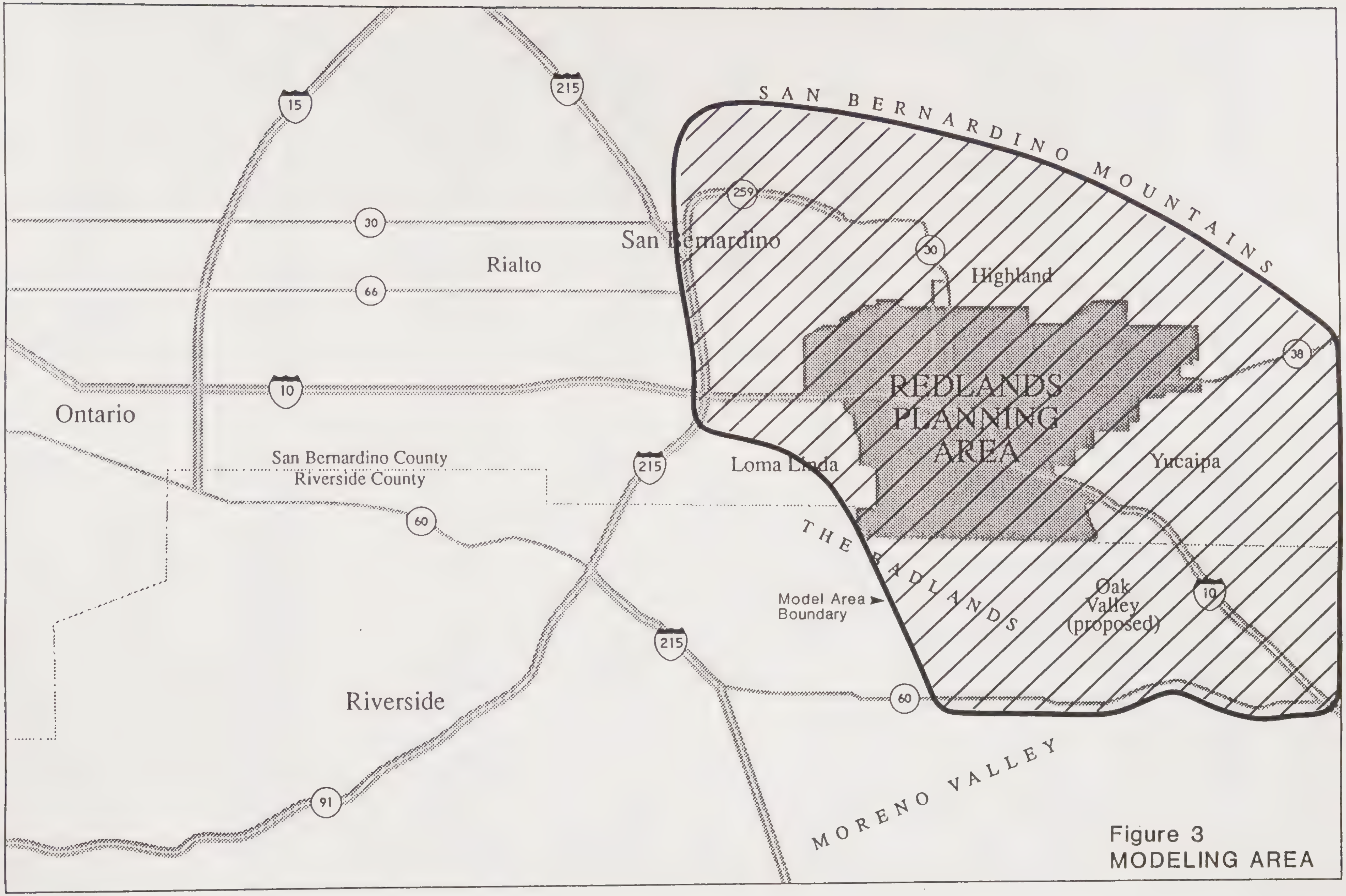
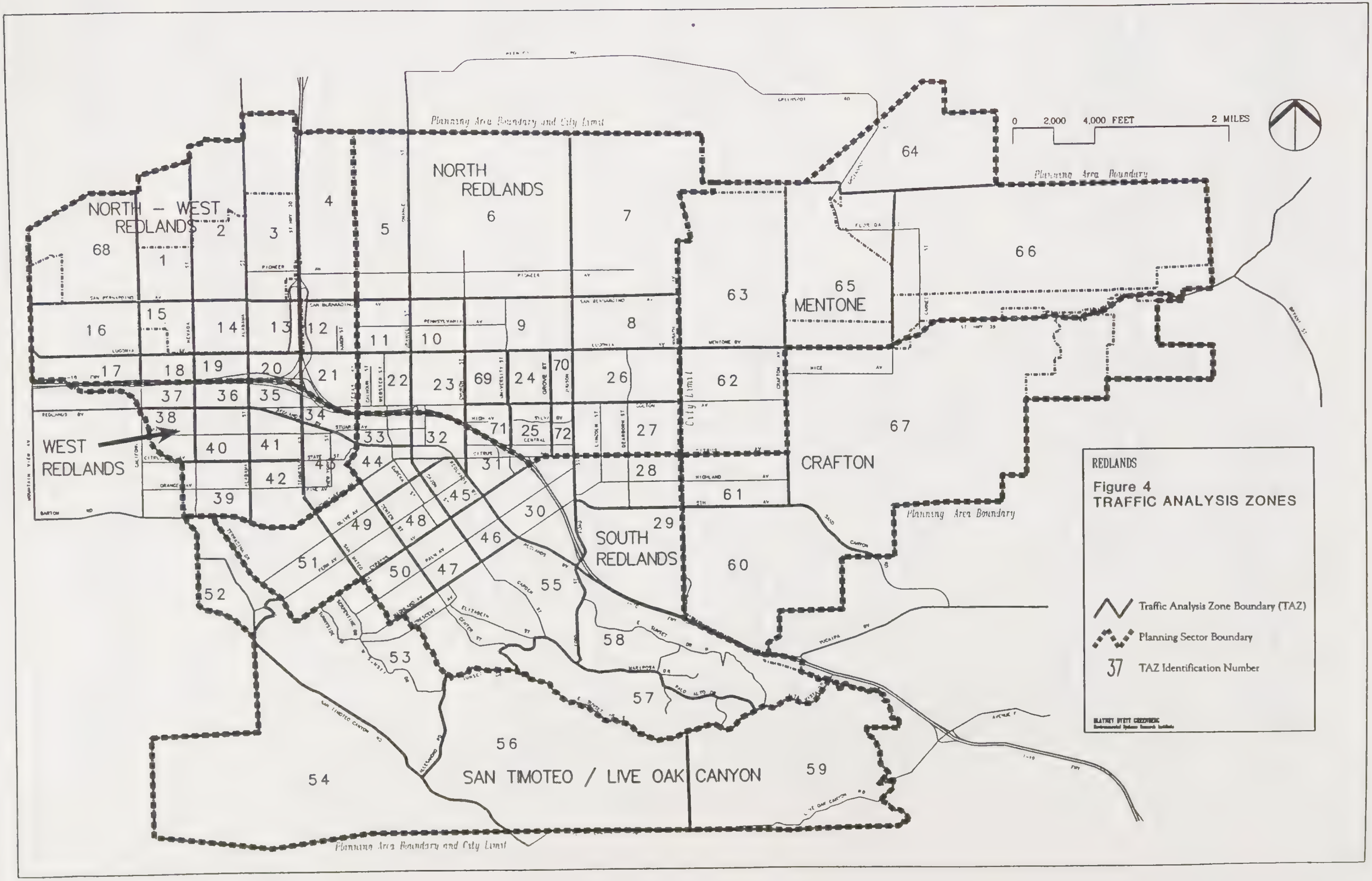



Figure 3
MODELING AREA



Planning Area Boundary and City Limit
Planning Area Boundary
City Limit
0 2,000 4,000 FEET 2 MILES
NORTH – WEST REDLANDS
NORTH REDLANDS
MENTONE
WEST REDLANDS
CRAFTON
SOUTH REDLANDS
SAN TIMOTEO / LIVE OAK CANYON
REDLANDS
Figure 4
TRAFFIC ANALYSIS ZONES
Traffic Analysis Zone Boundary (TAZ)
Planning Sector Boundary
37 TAZ Identification Number

The roadway network is comprised of a series of links (representing specific roadway segments) and nodes (representing intersections between two or more roadway segments). Roadway characteristics such as length, number of lanes, travel speeds and functional classification are encoded for each segment or link. This information is used to estimate travel times and vehicle capacities of each link.

The existing and alternative future roadway networks represented in the model include all freeways, arterials, rural highways, and most collectors within the study area, but do not explicitly include local streets and some collectors. Local streets and low volume collectors are instead implicitly represented by "centroid connectors". These are artificial network links that represent local travel between the centroid of a travel analysis zone and the adjacent major roadway network.

**Land Uses**

Land use data are the other key input to the traffic model, as they establish the magnitude and locations of trip-making activity. Land uses are stratified into land use categories and are quantified by geographical area traffic analysis zone.

Existing and future land uses for all areas within the Planning Area were initially based on ESRI's computerized data base of acreages by land use type. For modelling purposes, Blayney-Dyett-Greenberg and Smith, Peroni and Fox translated these into estimated housing unit counts, occupied floor areas and/or employment levels for commercial activity, school enrollment levels, and other measures of activity suitable for predicting trip generation in the traffic forecast model. The data on existing land uses were used for validating the model; future land uses were used for assessing future roadway needs.

**Regional Travel Estimation**

Three types of regional travel impact Redlands:

- **Buffer Area trips.** Trips which are generated outside of the City of Redlands but within the modeling area.

- **External trips.** Trips having either an origin or destination within the Redlands modeling area but the other end elsewhere.

- **Through trips.** Trips passing through the modeling area but having neither an origin nor a destination there.

Buffer area trips are represented by extracting the vehicle trips for each buffer area zone from the corresponding zones in the CTP model. Base year (1994) trips were estimated by interpolating between the CTP trips for 1990 and 2010. A separate interpolation factor was

used for each community based on SCAG population forecasts. Future buffer area trips are derived directly from the CTP 2010 vehicle trips. The buffer area trips are then distributed to Redlands and within the buffer area using the same procedures as those used for Redlands trips.

External trips and through trips are represented in the model as origins and destinations at the study area gateways. Base year external and through trip volumes were interpolated from the 1990 and 2010 CTP model trips, and were adjusted to match available 1994 traffic counts at the 15 gateways into/out of the Redlands modeling area (see Table 6 in Appendix A).

**Trip Generation**

The trip generation step uses a series of trip generation rates to relate specific land use quantities by type to the number of trips generated over the day (Table 2). The trip generation rates were initially derived from the Institute of Transportation Engineers *Trip Generation* reference and other similar studies. They were refined during the validation process to better represent local conditions.

In the Redlands model, trips are stratified into four trip purposes: home-work, home-shop, home-other, and non-home based. Splitting the trips into purposes allows for a better understanding of the relationship between jobs and housing, and also allows the model to account for different trip lengths for different trip purposes. Rates by purpose are given in Table 2 of Appendix A.

**Trip Distribution**

The Redlands model uses a standard method known as the "gravity model" for trip distribution. This method distributes trips between any two zones based on the number of trips generated in each of the two zones, and on factors that relate the likelihood of travel between any two zones to the travel time between the zones. The factors which relate travel time to the likelihood of travel ("friction factors") are consistent with the SCAG CTP model. From this process, a matrix of origin-destination pairs is created.

**Traffic Assignment**

The traffic assignment step assigns trips from each origin zone to each destination zone along specific roads. Roadway capacities are explicitly considered in the process. As traffic volumes on individual roadway links approach the capacities of the links, the assumed travel speeds are reduced and alternative routes are searched for in assigning further trips. This process tends to more realistically balance traffic assignments against available roadway capacities on the network. Overloading of individual links may still occur when alternative routes with competitive travel times are not available for a particular trip.

**Table 2**
**Redlands Trip Generation Rates**

| | Units | Daily Trip Ends Per Unit |
|---|---|---|
| *Residential* | | |
| Low Density | Units | 10.00 |
| Medium Density | Units | 7.40 |
| Mobile Homes | Units | 4.80 |
| *Retail* | | |
| Low Generating | 1,000 gsf | 40.00 |
| Medium Generating | 1,000 gsf | 75.00 |
| High Generating | 1,000 gsf | 125.00 |
| *Commercial* | | |
| Offices | 1,000 gsf | 11.50 |
| General Services | 1,000 gsf | 10.00 |
| *Industrial* | | |
| Light | 1,000 gsf | 7.00 |
| General | 1,000 gsf | 3.80 |
| *Schools* | | |
| Elementary/Jr High | Students | 1.00 |
| High School | Students | 1.40 |
| University | Students | 1.60 |
| *Other* | | |
| Hotels | Rooms | 8.70 |
| Hospitals | 1,000 gsf | 16.70 |
| Special Generators* | Trips | 1.00 |

gsf = gross square feet

* Includes parks, recreation, airport, churches, etc.

## BASE YEAR MODEL VALIDATION

The model was "validated" by applying existing (1994) land uses and roadway network data, and comparing model results to observed traffic levels in Redlands. As a first step, estimation procedures and parameters were specified for each step of the model process (trip generation, distribution and assignment) based on similar models from other communities. The model outputs (assigned traffic volumes on each roadway segment) were then compared

to available roadway traffic counts, and the model was iteratively refined until a good comparison between model-predicted volumes and traffic counts was achieved. The basic assumption here is that, if the model reasonably replicates existing conditions, then it can be used with confidence to predict future conditions.

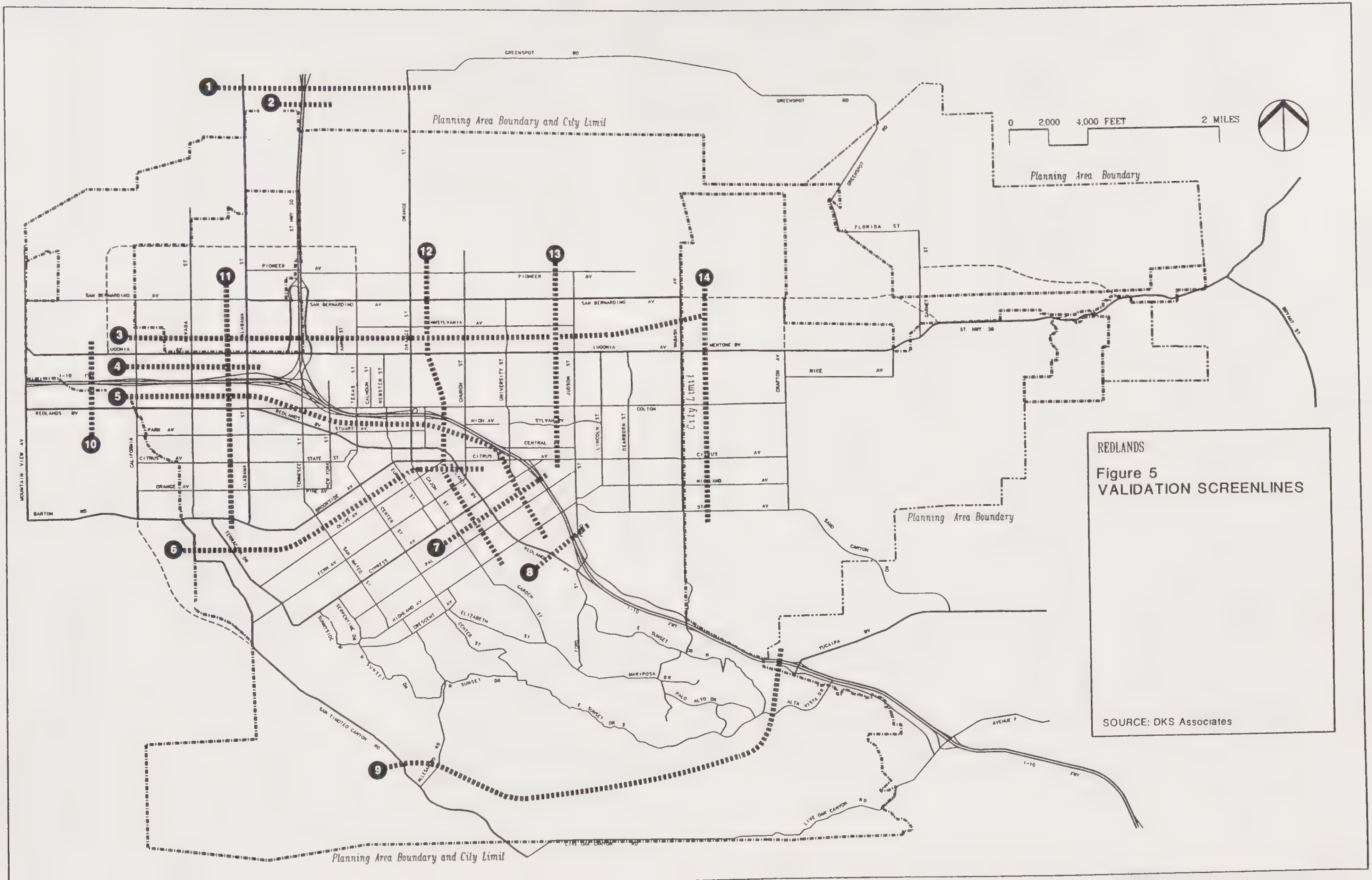
Existing (1994) land uses used for model validation are tabulated by zone in Appendix A.

For validation, 14 screenlines were defined throughout the study area (Figure 5). Screenlines are imaginary lines that cut the study area, intercepting all travel across portions of the study area. This eliminates issues about individual route choice in assessing the overall validity of the model. Once reasonable overall travel patterns are achieved by the model, it is possible to refine the network specifications to improve assignments to individual routes.

Table 3 summarizes the final validation results by screenline. At seven of the 14 screenlines, model-estimated volumes are within five percent of traffic counts. Volumes at six of the seven remaining screenlines are within 10 percent of traffic counts, while the model is within 18 percent of counts at one screenline. On that one screenline, the model is within six percent of counts on streets outside the downtown area, reflecting the fact that the model represents major arterial and collector streets well but does not represent local downtown circulation in great detail. These results indicate a good level of validation for the model.

Review of model-estimated volumes on individual routes within each screenline also shows a generally good comparison to actual counts, though some individual routes (particularly low volume ones) may not be well estimated. Freeway volumes are within 5 to 10 percent of counts at all locations. Again, this indicates a good level of model validation, and a sound tool for forecasting of future traffic.

It is important, however, to note that the model is a general analytic tool; it cannot be relied upon to provide exact volumes for existing or future conditions on any individual route. Actual traffic counts can easily vary by as much as 15 percent from day-to-day; model accuracy therefore cannot be expected to be any better than this. Accordingly, a certain degree of caution and engineering judgement is necessary in interpreting model results, particularly for lower volume and localized routes.




REDLANDS

Figure 5
VALIDATION SCREENLINES

SOURCE: DKS Associates

**Table 3**
**Model Validation Results by Screenline**

| Screenline | Location | Limits | 1994 Count | Model Volume | Volume/ Count |
|---|---|---|---|---|---|
| 1 | Santa Ana Wash | Palm-Orange | 15,300 | 16,700 | 1.09 |
| 2 | Santa Ana Wash | SR 30 | 46,000 | 45,500 | 0.99 |
| 3 | N. of Lugonia | California-Wabash | 37,900 | 34,700 | 0.92 |
| 4 | S. of Lugonia | California-Alabama | 18,300 | 18,700 | 1.02 |
| 5 | S. of I-10 Freeway | California-Highland | 121,000 | 98,600 | 0.82 |
| 6 | S. of Brookside/Citrus | San Timoteo-Church | 53,000 | 57,000 | 1.08 |
| 7 | S. of Cypress | Cajon-Judson | 107,500 | 101,600 | 0.94 |
| 8 | S. of Highland | Redlands-Ford | 103,500 | 96,800 | 0.94 |
| 9 | N. of Live Oak Canyon | S. Timoteo Canyon-I-10 | 96,000 | 98,200 | 1.02 |
| 10 | W. of California | Lugonia-Redlands | 160,800 | 175,400 | 1.09 |
| 11 | W. of Alabama | San Bernardino-Barton | 191,600 | 199,000 | 1.04 |
| 12 | E. of Orange/Cajon | Pioneer-Highland | 183,800 | 175,400 | 0.95 |
| 13 | W. of Judson | Pioneer-Citrus | 36,800 | 39,800 | 1.08 |
| 14 | E. of Wabash | San Bernardino-5th | 27,700 | 28,400 | 1.03 |

## CMP MODEL INTERFACE

San Bernardino County's Congestion Management Plan requires that local jurisdictions implement local transportation models or analytical procedures capable of analyzing the impacts of land use decisions on the regional transportation system. Local models are to be consistent with the SCAG regional model and the officially adopted socioeconomic data bases.

The Redlands model could be adapted to satisfy the CMP requirements for local modeling. It utilizes SCAG CTP model inputs to establish regional travel patterns and extends to neighboring jurisdictions. The existing and future networks are consistent with SCAG CTP model network specifications, and the model structure and parameters are generally consistent. Both the Redlands and CTP models use micro-computer based TRANPLAN software, simplifying the transfer of data and comparison of results. The key differences are in the land use/trip generation component:

- To better portray local travel, the Redlands model uses residential units and floor areas for representing land use within the Planning Area, rather than population and employment variables as used in the CTP model. Factors could be developed to

correlate the two types of data. (Within the buffer area, CTP trips are used directly in the Redlands model.)

- The Redlands model directly generates vehicle trips rather than incorporating a mode choice step as in the CTP model. Mode choice estimation is not practical in local models since many transit trips extend outside the local area and can therefore not be well represented. It would be possible, however, to reflect projected future modal shifts estimated from the CTP model into the Redlands model by factoring the vehicle trip generation rates.

- The analysis of Redlands circulation needs reflects buildout land use projections within Redlands, rather than any particular horizon year. The CTP model uses 2010 projections of population and employment. However, the Redlands model will accept land use inputs for any study year desired, and a 2010 interim year forecast has been evaluated during the course of this study.

In sum, with some limited adaptation, the Redlands model could provide a useful tool for the city in analyzing land use and network alternatives associated with the CMP.

# 4. Proposed Circulation Element

# 4. Proposed Circulation Element

The recommended Circulation Element of the General Plan is described in this chapter. It is designed to support the Land Use Element completed in September, 1994.

## PLAN DEVELOPMENT PROCESS

Starting in 1988, future transportation needs were assessed at several interim steps in the study process, leading to development of the recommended circulation system.

As a first step, implications of the 1972 General Plan (as amended) on potential 2010 traffic were tested. These preliminary tests indicated the potential for substantial traffic growth by 2010 due to Planning Area and regional growth. Interstate 10 freeway traffic was projected to double, and streets east of SR 30 would carry two to four times their present volumes. Widening of a number of arterial streets to six lanes was projected, such as San Bernardino Avenue, Lugonia Avenue, Redlands Boulevard, Colton Avenue, Citrus Avenue east of I-10, and Orange Street north of I-10. Under the higher growth scenario, Alabama Street would need eight lanes near I-10.

Based on results of the Policy Alternatives (including traffic as well as a variety of other evaluation criteria) and inputs from the Citizens Advisory Committee and the City, a preliminary buildout land use alternative was developed for more detailed testing and evaluation in 1991. Sizable traffic increases were projected throughout much of Redlands under this scenario. In particular, extremely high traffic volumes (up to 78,000 daily vehicles) were projected on the three I-10 freeway access routes west of SR 30. This was attributable to employment growth in the East Valley Corridor.

Based on these results and other evaluation criteria, revised land use scenarios were developed. The circulation recommendations that follow in this chapter and the transportation impacts described in Chapter 5 are based on the revised land use inputs.

## STREET NETWORK AND CLASSIFICATION

The proposed street network is shown in Figure 6, including functional classifications and the ultimate number of travel lanes needed to accommodate future traffic levels at build-out, and showing conceptual alignments for new roads. Key objectives of the proposed circulation network are to:

- Permit traffic to choose reasonably direct paths to destinations throughout the city.
- Minimize intrusion of through-traffic onto local streets.
- Avoid over-reliance on I-10 freeway for intra-city travel.
- Provide efficient routes for transit service, emergency and other service vehicles.

Within the City of Redlands, there are only a few opportunities for new circulation routes. Hence, the recommended plan focuses on expanding the capacity and efficiency of the existing circulation system in the developed portions of the city. Only a few new routes are included, and these tend to be in the currently undeveloped outlying areas of Redlands.

### Functional Classification System

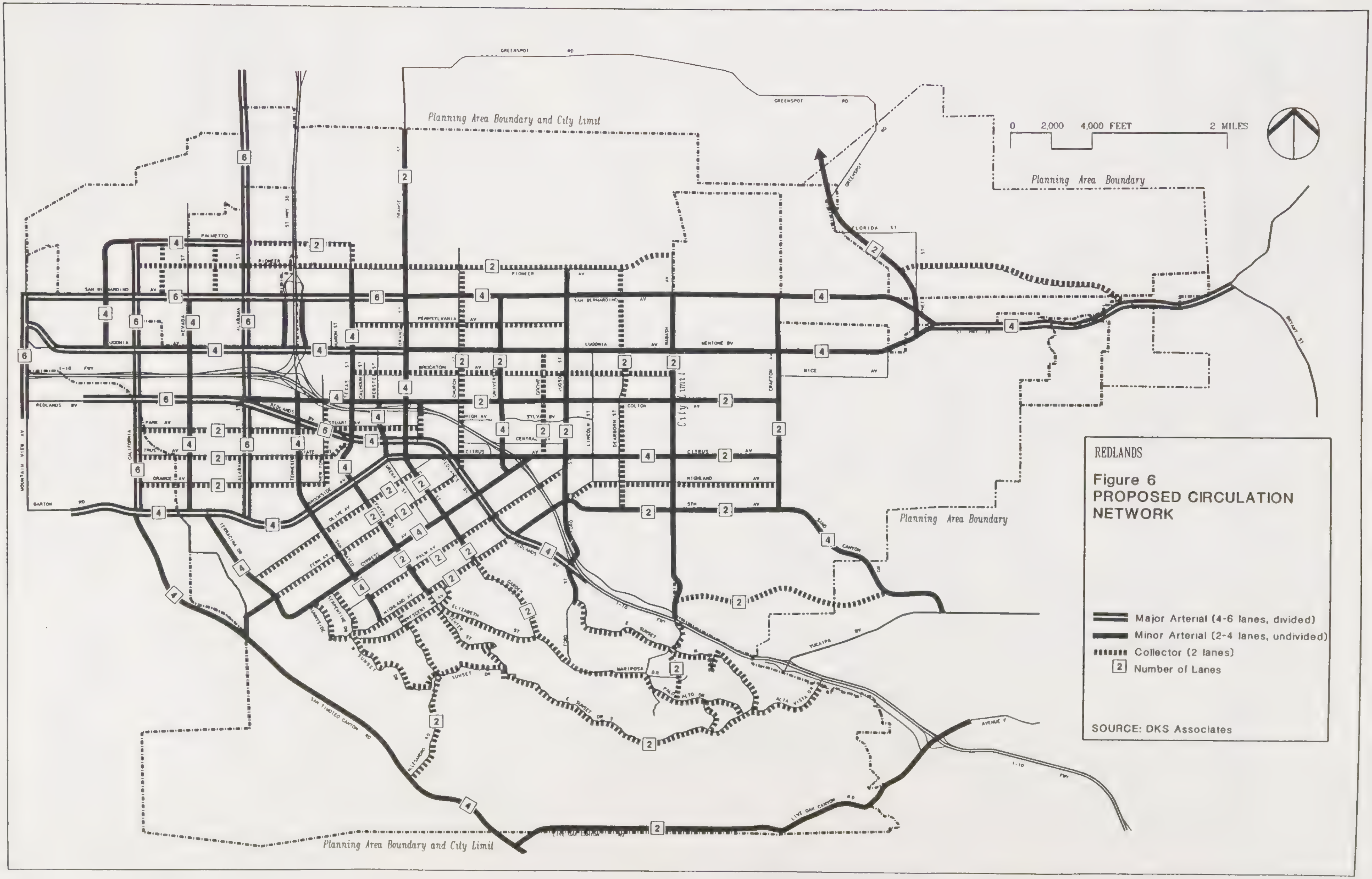
The current (1972) General Plan map designates freeways, major highways, secondary highways, collector streets, and scenic routes. Most of the designated "highways" are designed and used as arterial streets. Accordingly, the proposed circulation network classification system includes freeways, arterials, collector streets and local streets. Arterials are further divided into major and minor arterials. This functional classification system will help to identify which existing streets are to carry traffic and which are to serve primarily as access to adjoining frontage, as well as to give general guidelines for their ultimate design.

The function and design of each component of the circulation system are described below:

### Freeways

Freeways are designed to move traffic in a continuous, uninterrupted flow through metropolitan areas, between cities, or to and from major traffic generators (such as shopping, employment, and recreation areas). Speeds are high and access is limited.

I-10 and Route 30 are the only freeways in the Planning Area. Redlands is highly dependent upon the regional access provided by these freeways. The Circulation Element assumes eventual widening of I-10 to add an HOV lane in each direction through Redlands. This is consistent with Caltrans' I-10 Route Concept Report, but is not included in SCAG's 20-year Regional Mobility Plan. Route 30 has been extended as a freeway north from Redlands through Highland to connect with existing Route 30 freeway at Highland Avenue in San Bernardino, consistent with the Regional Mobility Plan. Caltrans' Route Concept Report for this freeway calls for four freeway lanes through Redlands up to 2005. However, with full


REDLANDS
Figure 6
PROPOSED CIRCULATION NETWORK
Major Arterial (4-6 lanes, divided)
Minor Arterial (2-4 lanes, undivided)
Collector (2 lanes)
Number of Lanes
SOURCE: DKS Associates
Planning Area Boundary and City Limit
Planning Area Boundary
City Limit
0 2,000 4,000 FEET 2 MILES

buildout of the East Valley Corridor and the rest of Redlands, as well as growth in other nearby communities, the projected need is for six lanes (two of these could be HOV lanes).

To ensure adequate access from Redlands to I-10 and SR 30 freeways, freeway interchange improvements also need to be considered in the future. This is particularly the case for freeway interchanges in the East Valley Corridor:

- I-10/Alabama
- I-10/California
- I-10/Mountain View
- Route 30/San Bernardino

The EIR for the East Valley Corridor Specific Plan notes the need for lane widenings to partially mitigate traffic impacts at these locations. In some cases, reconfiguration of on or off ramps may be desirable in addition to roadway and ramp widening.

**Major Arterials**

Arterials provide for circulation between major activity centers and residential areas in the City; they also provide access to freeways. Major arterials usually carry the highest volumes and/or longest trips in the city. Major arterials are high-capacity, moderately high speed routes, typically four to six lanes wide. For high capacity they should have medians between intersections and additional lanes at intersections. Service to abutting properties may be provided but should be subordinate to through-travel needs.

The proposed Circulation Element includes the following improvements and/or extensions of major arterial routes within Redlands:

- Alabama Street: 6 lanes
- California Street: 6 lanes
- Barton Road/Brookside Avenue: 4 lanes
- Redlands Boulevard: 4-6 lanes
- Lugonia Avenue, west of Orange Street: 4 lanes
- San Bernardino Avenue, west of Orange Street: 6 lanes
- Palmetto Avenue west of SR 30: 4 lanes
- Mill Creek Road (SR 38): 4 lanes

**Minor Arterials**

Minor arterials typically interconnect with and augment the major arterial system, and serve trips of moderate length. Minor arterials may permit access to abutting properties, although traffic capacity is equally important. Minor arterials are typically no more than four lanes wide and, to minimize roadway width and right-of-way, may be undivided (no median).

Lower volume minor arterials may be two lanes wide, although left-turn lanes should be provided at intersections and/or a continuous two-way left turn lane to improve traffic flow.

The proposed Circulation Element includes the following minor arterials:

- Nevada Street: 4 lanes
- Terracina Drive: 4 lanes
- Tennessee Street/San Mateo Street: 4 lanes
- Texas Street: 4 lanes
- Orange Street/Cajon Street: 4 lanes from Citrus to San Bernardino; 2 lanes elsewhere
- University Street: 4 lanes south of Colton; 2 lanes to the north
- Judson Street/Ford Street: 2 lanes
- Wabash Avenue: 2 lanes
- Crafton Avenue: 2 lanes
- San Bernardino Avenue, east of Orange Street: 4 lanes
- Lugonia Avenue/Mentone Avenue, east of Orange Street: 4 lanes
- Colton Avenue: 4 lanes west of 6th; 2 lanes to the east
- Citrus Avenue: 4 lanes west of Wabash; 2 lanes to the east
- Fern Avenue west of Terracina: 2 lanes
- Cypress Avenue: 4 lanes
- Highland Avenue, Redlands to Judson: 2 lanes
- 5th Avenue: 2 lanes
- Sand Canyon Road: 4 lanes
- Live Oaks Canyon Road: 2 lanes
- San Timoteo Canyon Road: 2 lanes

### Collectors

Collector routes funnel traffic from local access streets to the arterial street network. They are typically fronted by residences, commercial or public activities. They are usually two-lane streets, and maximum acceptable volumes are dictated by resident concerns about intrusion rather than traffic capacity considerations.

Development of collector streets is a key requirement to ensure the functioning of the proposed circulation network and should therefore be considered an integral element of the recommended circulation system. As a general guideline, there should be a set of east-west and north-south roadways that connect the various major and minor arterials, allowing local traffic to circulate without using the arterials for short trips. The placement and sizing of collector streets are dependent on the specific design concepts of the developments.

Existing and known future collector routes within the Planning Area are indicated above in Figure 6. No attempt has been made to specify locations and alignments for collector streets in currently undeveloped areas except where collector streets have already been designated (e.g., East Valley area). Additional collectors may be warranted depending on specific design of new developments. Below is a summary listing of existing and proposed collector streets.

**Existing Collectors**

- E. Sunset Drive (north and south)
- W. Sunset Drive
- Allesandro Road
- Garden Street
- Elizabeth Street
- Center Street, south of Highland Avenue
- Mariposa Drive
- Palo Alto Drive
- Alta Vista Drive
- Crescent Avenue
- Serpentine Drive
- Sunnyside Avenue
- Highland Avenue, west of Redlands Boulevard
- Highland Avenue, east of Ford Street
- Palm Avenue
- Fern Avenue
- Olive Avenue
- Orange Avenue/Pine Avenue
- Citrus Avenue, west of Texas Street
- Park Avenue
- Stuart Avenue
- Brockton Avenue
- Pennsylvania Avenue
- Pioneer Avenue
- New York Street
- Church Street
- Grove Street
- Dearborn Street

**New Collectors**

- Crafton Hills Drive
- Sunrise Ranch Road
- Pioneer Avenue, west of Alabama Street
- Palmetto Avenue

### Local Streets

Other streets not specifically designated as either arterial or collector streets should be designated as local streets. These are intended to provide direct access to single-family residential lots or individual commercial/public uses, and should be designed as relatively short, discontinuous streets so as to discourage their use by through traffic. Single access or "dead-end" streets should be avoided in large developments.

Local streets are not indicated on the plan, but should be developed as necessary with specific site plans to provide access to the major circulation network.

## TRAFFIC SERVICE LEVEL STANDARDS

### Arterials

Levels of service on arterial routes are generally dictated by intersections along them. Traffic service should be maintained at Level of Service D or better at all intersections along arterial routes within the city. Except as noted below, the LOS D conditions should be present for no more than three hours of the day (A.M. peak, P.M. peak and noon-time) at any location. During other periods, LOS C or better should be maintained. This is intended as a design standard for planning future street improvements as well as for evaluating specific development proposals. Traffic improvements defined later in this Circulation Element should be initiated before levels of service deteriorate to beyond these standards.
Intersections along the following arterial routes may exceed these levels of service based on general level of service projections of the General Plan at buildout:

- San Bernardino Avenue at SR 30
- Lugonia Avenue, Alabama Street to Orange Street
- California Street, Lugonia Avenue to I-10
- Alabama Street, San Bernardino Avenue to Redlands Boulevard

Additional changes to the Plan will be needed to maintain acceptable levels of service for these streets and these changes may include traffic management strategies, traffic control measures, and land use and intensity changes. Policies outlined in Section 5.20 of the General Plan incorporate these elements.

### Collector and Local Streets

Collector and local access streets normally have the capacity to carry far more traffic than is acceptable to most people living along the streets. In *Liveable Streets*,[1] Donald Appleyard

[1] Appleyard, Donald, *Liveable Streets*, University of California Press, 1981, page 271.

indicates that residents often begin to be concerned about adverse traffic impacts due to noise, privacy, speeding, safety for children and the like when it reaches levels of 500-800 vehicles per day, and identifies the "environmental capacity" for a residential street to be about 2,000 to 3,000 vehicles per day or about 200 vehicles per hour in the peak.

In light of the above, new areas should be designed to keep traffic levels on local streets below about 500-800 vehicles per day and to keep traffic levels on residential collectors to less than 3,000 vehicles per day. When new residential development is anticipated to result in traffic volumes approaching 3,000 vehicles per day, the development should be designed without residential units directly fronting on the street in question.

It is recognized that a number of existing collector streets within the developed area of Redlands already carry traffic volumes that exceed the desirable standards for residential streets. This is largely a result of infrequent arterial and collector spacing in the existing circulation network. This is particularly the case in the hillside areas of south Redlands. As a general rule, *no new subdivisions should make use of these streets*. Should additional traffic growth occur on such streets in the future, the City could consider neighborhood traffic control measures to reduce traffic to acceptable levels, if requested by residents of the area. Examples of these measure are stop signs, traffic signal modifications, traffic diverters and the like.

### Intersections

To maintain traffic levels-of-service and safety on major streets, intersection approach lane expansion, related channelization improvements and traffic signal installations will be needed at a number of locations throughout the City's Planning Area. It is not the function of the General Plan to detail these improvements. Specific improvements should be identified and carried out only in response to detailed traffic studies and, in the case of traffic signals, application of appropriate warrants.

## STREET DESIGN STANDARDS

The City should maintain a uniform set of street standards that reflects the differing functions of arterial, collector and local streets and provides for alternative lane widths as needed for capacity. Figure 7 presents the proposed street standards for each functional classification and number of lanes. These are for typical midblock application. Additional right-of-way may be needed for turn lanes at some intersection approaches. Curb lanes may be used for parking or bike lanes, as appropriate.

For some projects, exceptions to these standard cross-sections may be desirable due to right-of-way limitations, aesthetics, special access conditions or the like. Examples of this are the East Valley Corridor and Downtown Specific Plans. These exceptions should be kept to a minimum, however, and should be evaluated on a case-by-case basis.

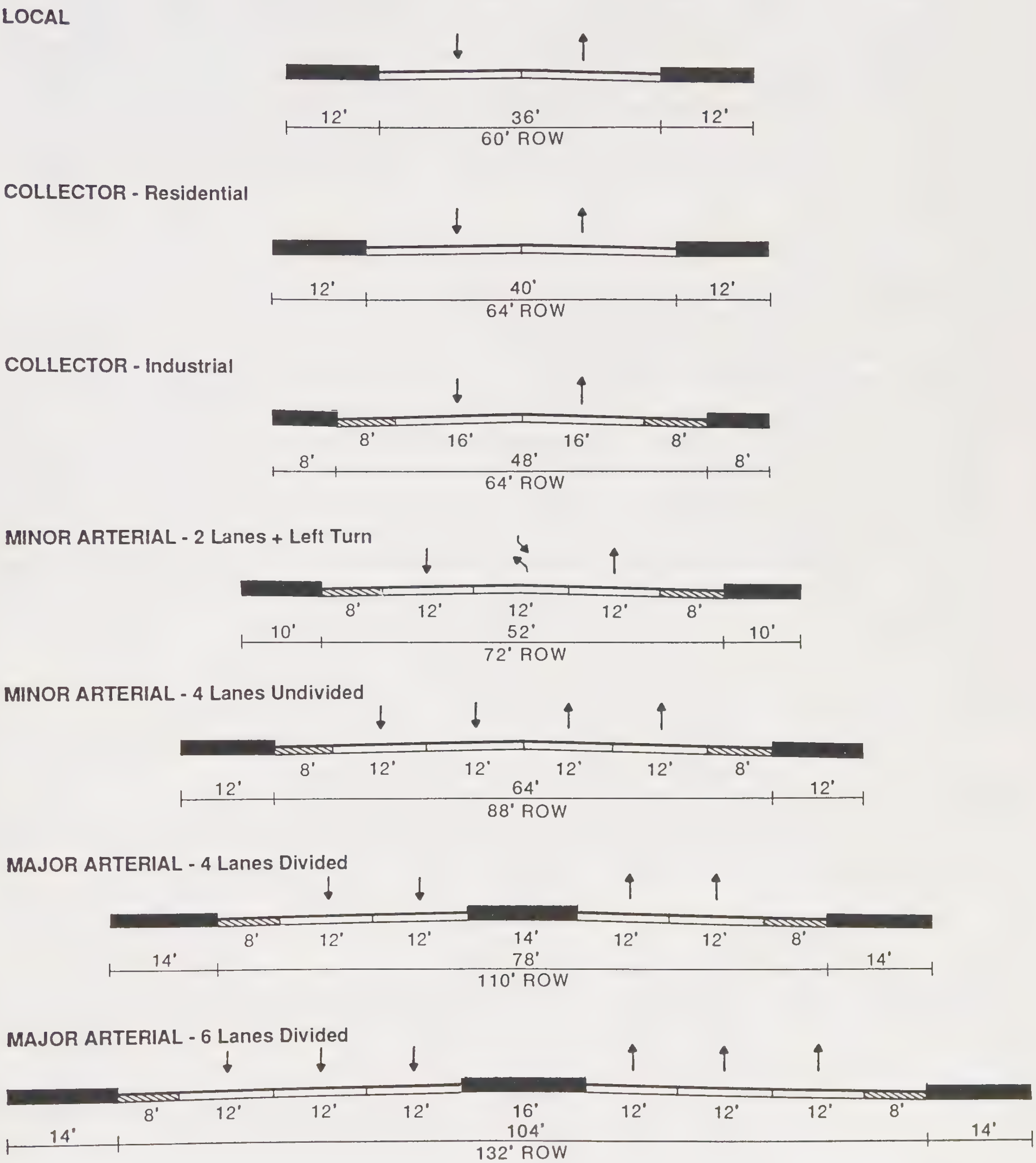



Figure 7
PROPOSED ROADWAY WIDTHS

No "typical" cross-sections are shown for eight-lane arterials since these should only be used where alternatives do not exist, and detailed design studies should be conducted. The recommended circulation plan includes one location where an eight-lane arterial appears to be necessary ultimately: Alabama Street north of I-10. Arterials of this size have been built in similar situations where large capacities are required for freeway access and no reasonable alternatives exist. Pedestrian refuges must be provided due to the width of the intersection approaches. Also, access to and from these arterials must be limited to a few widely spaced signalized intersections in order to minimize weaving problems. The signals would help to split traffic into groups ("platoons") of vehicles; this improves weaving operations beyond the signals.

## ARTERIAL FRONTAGE ACCESS

The primary role of an arterial street is to carry traffic safely and efficiently. When a major arterial becomes congested, traffic tends to spill over onto local streets intended for lighter traffic volumes and, in some cases, to the freeway system which is intended for longer distance trips. Neither of these diversions is desirable. Therefore, the carrying capacity of arterial streets should be maximized by controlling the number of intersections and driveway access points, but encouraging any residential development to back onto the street, providing sufficient on-site parking to eliminate the need for on-street parking, and concentrating office/commercial developments into areas that can be effectively served by a few access points. This is particularly the case along Alabama Street, California Street and San Bernardino Avenue within the East Valley Specific Plan area.

Specific guidelines for arterial access are as follows:

- Provide smooth access/egress to fronting development, including designing parking areas so that traffic does not stack up on the arterial street.

- Locate high traffic generating uses with direct access or immediate secondary access to arterial streets so that site-generated traffic does not use local streets.

- Restrict residential driveway access by backing residences onto the arterial or by using frontage roads for driveway access.

- Encourage development of non-peak generating uses such as recreational centers, churches and the like along arterial streets.

- Combine driveways to small parcels, and maintain adequate distances between driveways and intersections to permit safe, efficient traffic merges.

## BICYCLE AND PEDESTRIAN CIRCULATION

The relatively flat valley portion of Redlands, with about two-thirds of the Planning Area's potential residents and almost all of its jobs, is attractive for both bicycle commuters and recreational riders. Establishment and adoption of a city-wide bicycle circulation plan are recommended in order to preserve adequate right-of-way and roadway space on appropriate bicycle routes in accordance with anticipated land use/traffic patterns in the City.

### Bicycle Routes

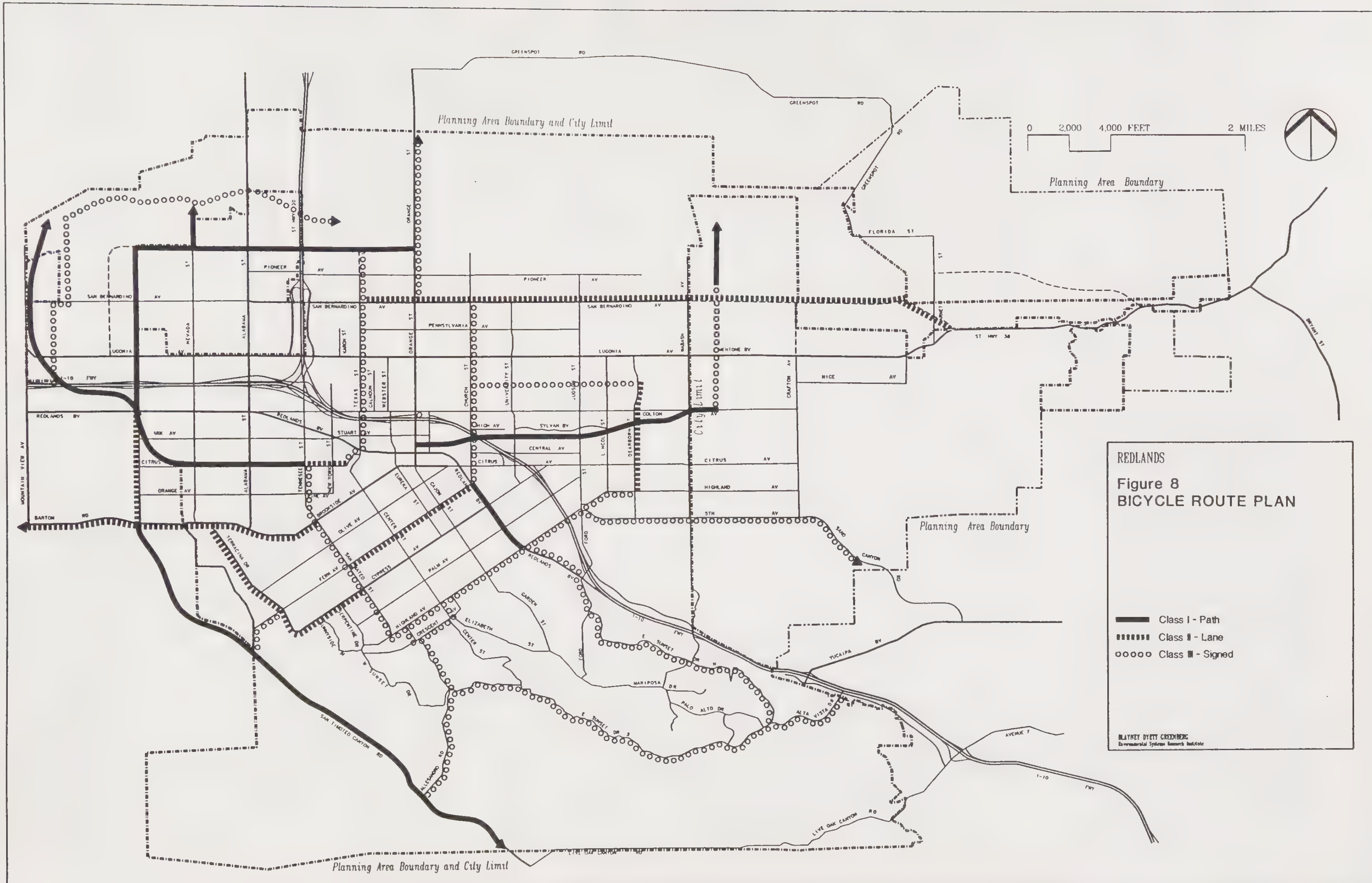
A comprehensive network of on- and off-street bicycle routes should be developed within the City's Planning Area boundary to encourage and facilitate the use of bicycles for commute, recreational, and other trips. A proposed system of bicycle routes in shown in Figure 8. The plan is based on the city's *Master Plan for Bikeway System* (currently being considered for adoption) and on designations in the East Valley Corridor Specific Plan. Three types of bicycle routes are distinguished on the figure:

- **Class I:** Separate bike path (off-street).
- **Class II:** On-street bike lane (striped).
- **Class III:** On-street bike route (signed only; bicycles share the roadway with vehicles).

Off-street bike paths (Class I) are proposed as follows:

- In the Zanja corridor west of Tennessee Street, for access to East Valley Corridor jobs and for recreational access to the Santa Ana Wash.
- Along portions of California Avenue and Palmetto Avenue, as designated in the East Valley Corridor Specific Plan.
- Along the Santa Fe railroad right-of-way from downtown Redlands to east of Wabash.

On-street bike lanes are proposed along portions of Cypress Avenue, Fern Avenue, Terracina Drive, Barton Road/Brookside Avenue, California Street, State Street, San Bernardino Avenue and Dearborn Street. These routes, in combination with the above Class I routes, will provide good bike access between residential areas of Redlands and the East Valley Corridor.


REDLANDS
Figure 8
BICYCLE ROUTE PLAN
Class I - Path
Class II - Lane
Class III - Signed
BLAYNEY DYETT GREENBERG
Environmental Systems Research Institute
0 2,000 4,000 FEET 2 MILES
Planning Area Boundary and City Limit
Planning Area Boundary
Planning Area Boundary
Planning Area Boundary and City Limit
City Limit
GREENSPOT RD
SAN BERNARDINO AV
PIONEER AV
PENNSYLVANIA AV
LUGONIA AV
MENTONE BV
I-10 FWY
REDLANDS BV
COLTON AV
SYLVAN BV
CENTRAL AV
CITRUS AV
HIGHLAND AV
5TH AV
BARTON RD
ORANGE AV
FLORIDA ST
ST HWY 38
RICE AV
SAND CANYON RD
YUCAIPA BV
SAN TIMOTEO CANYON RD
LIVE OAK CANYON RD
MOUNTAIN VIEW AV
BRYANT ST
AVENUE F
ALTA VISTA DR
MARIPOSA DR
PALO ALTO DR
E SUNSET DR S
CRAFTON AV
WABASH AV
DEARBORN ST
FORD ST
ORANGE ST
CHURCH ST
UNIVERSITY ST
TENNESSEE ST
ALABAMA ST
NEVADA ST

Signed bike routes (Class III) should be designated along appropriate collectors (Highland Avenue, Sunset Drive, Allesandro Road, Alta Vista Drive and Opal Street) and minor arterials (San Mateo Street, 5th Avenue, Sand Canyon Road, Texas Street, Church Street and Orange Street).

### Other Bicycle Facilities

Well located, secure bicycle storage facilities should be provided at employment sites, shopping and recreational areas and schools in order to facilitate bicycle usage. Employers often provide shower and changing facilities where sizeable numbers of employees use bicycles. Bicycle storage and other support facilities should be incorporated into Travel Demand Management plans at employment sites within the City, and should also be installed at public facilities within the City of Redlands.

### Pedestrian Facilities

Increased intensities and mixing of land uses in Redlands in the future, along with increased dependency on public transportation, will reinforce the need for a comprehensive network of pedestrian routes and related pedestrian amenities. The pedestrian network should link places of work with eating and drinking places, office supply and business service establishments, transit stops, recreation, as well as residential areas.

In general, sidewalks should be provided along both sides of all streets within business/commercial areas. Particular emphasis on pedestrian routes and amenities should be placed in the downtown area and in the East Valley area. Furthermore, any new or improved I-10 and SR 30 freeway crossings should incorporate pedestrian paths or sidewalks.

Generally, the pedestrian paths should have a minimum width of 4 feet (exclusive of curb) where pedestrian traffic is light, and 10 feet where pedestrian activities are more concentrated. Sidewalks should be free of obstructions such as signs. In areas near transit stops and support retail and service centers, malls and plazas should be encouraged, fronted by restaurants and shops.

## TRAVEL DEMAND MANAGEMENT

The term "Travel Demand Management" (TDM) refers to measures designed to reduce peak-period auto traffic. These include public transit, flexible working hours, carpooling and vanpooling, and incentives to increase the use of these alternatives. TDM has become increasingly important in maintaining acceptable levels of service on existing routes in the region.

In developing the roadway network for the General Plan, transportation studies assumed that peak hour trip rates at major employment centers would be typical of current conditions. Based on this, LOS deficiencies were identified on freeway access routes into/out of the East Valley Corridor area of Redlands at full buildout. To achieve acceptable LOS, a 10-15 percent reduction in peak period trips would be needed relative to the number of trips that would be generated from the same floor area without active promotion of trip reduction.

The City, in an effort to help reduce peak period auto traffic to and from employment sites within Redlands, adopted a Travel Demand Management Ordinance in 1993. This ordinance was drafted as recommended by the County to satisfy the guidelines of the Congestion Management Program (November 4, 1992). The TDM ordinance requires that each participating employer to develop and implement a program to facilitate and promote commute alternatives such as carpools, public and private transit services, bicycles and alternative work hours. The program should target large employers within the East Valley since this is the area that is projected to experience the heaviest traffic congestion during commute hours and since TDM is usually found to be most effective at large employment sites. The TDM program should be mandatory in order to ensure a high level of participation. Table 4 summarizes possible TDM measures, based on the County's draft CMP.

With a successful TDM program, the peak period levels of traffic service projected for this Circulation Element are expected to be somewhat improved at build-out of the area, particularly during peak commute hours when congestion is greatest. The improvement would not avoid the need for roadway improvements proposed in the Circulation Element, but would ensure better levels of service in the future. Therefore, this program is considered a necessary component of the overall Circulation Element.

**Table 4**
**Travel Demand Strategies**

| TDM Ordinance Provision Options | Strategies Which Emphasize Air Quality | Strategies Which Help Congestion Management |
|---|---|---|
| Transportation Allowance Instead of Subsidized Parking | X | X |
| *Ridesharing* | | |
| Rideshare Transportation Allowance | X | X |
| Ridesharing Subsidy Tax Credits or Fees for Solo Commuters | X | X |
| Ridesharer Parking Cost Subsidy | X | X |
| *Ridematching* | X | X |
| *Guaranteed Ride Home* | X | X |
| *Flex-Time* | | X |
| *Compressed Work-Week* | X | X |
| *Telecommuting from Home* | X | X |
| *Telecommuting from Satellite Work Center* | | X |
| *Transit Subsidies* | X | X |
| *Commuter Stores* | | |
| *Marketing Programs* | X | X |
| *Expanded On-Site Amenities* | X | X |
| *Walking* | | |
| Showers and Lockers | X | X |
| Safe Walking Routes | X | X |
| *Bicycling* | | |
| Showers and Lockers | X | X |
| Bicycling Information (Maps) | X | X |
| *Regulate Medium and Large Employers* | X | X |

Source: San Bernardino County CMP , November 4, 1992 (Table prepared by Commuter Transportation Services).

**Table 4 (Continued)**
**Travel Demand Strategies**

| TDM Ordinance Provision Options | Strategies Which Emphasize Air Quality | Strategies Which Help Congestion Management |
|---|---|---|
| ***Regulate Multi-Tenant Building Owners*** | X | X |
| ***Regulate Developers*** | | |
| Required Mixed Use | X | X |
| Required Amenities that Reduce Need for Trips | X | X |
| Design Guidelines for Transit, Vanpools, Walking and Bicycling | X | X |
| Increase Residential Densities at Transit Stations | | X |
| Fee Credits for Building Designs which Promote TDM Measures | X | X |
| Fee Credits for Building Remote Park & Ride Facilities | | X |
| ***Parking*** | | |
| Preferential Parking for Ridesharers | X | X |
| Subsidized Parking for Ridesharers | X | X |
| Remote Park & Ride Lots with Amenities | | X |
| Support Zoning Code Variances for Commercial Uses Within Park & Ride Facilities | | X |
| Provide Bicycle Parking | X | X |
| Lower Development Sq./Ft. Ratios and Maximum Limits | | X |

Source: *San Bernardino County CMP*, November 4, 1992 (Table prepared by Commuter Transportation Services).

## PUBLIC TRANSIT

Redlands is currently served by four Omnitrans bus routes, but transit presently accounts for under 1 percent of overall travel in Redlands. When higher employment and residential densities are reached at full development, public transit should play a larger role in transportation in the area, particularly for commute trips attracted to the East Valley Corridor and for trips by local residents to and from other employment centers in the region.

### Congestion Management Program

The City of Redlands supports the transit goals, objectives, and standards as contained in the current Congestion Management Program or updates thereto. These include standards for local transit service; service to major employment/activity centers (such as East Valley Corridor); and corridor services between San Bernardino and Redlands and between Highland and Redlands. These services will become increasingly important in the future in order to minimize traffic growth on city streets.

### Regional Services

Commuter rail service on the Santa Fe line extends from downtown Los Angeles as far east as San Bernardino; future convenient feeder transit service from Redlands and park-and-ride facilities could make this attractive to some Redlands commuters. In the longer range (post-1995) commuter rail service may be extended from San Bernardino to Redlands, making the service more attractive for Redlands residents traveling to/from the west. The City of Redlands should support the implementation of these services to help reduce traffic levels on city streets.

### Local Routes

A coordinated system of regional as well as local transit routes appears necessary to maintain acceptable levels of service. With future extension of commuter rail service to Redlands, it will be necessary to provide for effective local feeder bus service to and from the regional transit line.

Currently, segments of Barton Road, Brookside Avenue, Terracina Drive, Fern Avenue, San Mateo Street, Cypress Avenue, Citrus Avenue, Redlands Boulevard, Orange Street, Cajon Street, Tennessee Street, Brockton Avenue, Lugonia Avenue, San Bernardino Avenue, Church Street and University Street are used by Omnitrans. Other streets that are likely candidates for bus service in the future as the need for local bus service increases are Alabama Street, California Street and/or Nevada Street in the East Valley Corridor. Widening or improvement plans for these streets should specifically allow for the possibility of transit operations.

## GROWTH OUTSIDE THE PLANNING AREA

The Circulation Element proposed here is designed to balance potential land use development within the Planning Area against transportation capacity. As noted in Chapter 5, the traffic forecasts also assume SCAG projections of growth to 2010 in the areas surrounding Redlands, as well as partial buildout of the proposed Oak Valley development south of Redlands. The projected land uses use up essentially the full capacity of the proposed arterial/collector system in Redlands, and further expansion of the circulation system components is not likely to be acceptable to the community.

For any development level beyond that assumed in the General Plan, alternative access plans must be considered. Future studies for development in the Oak Valley area and for use of San Bernardino International Airport should evaluate impacts of full General Plan buildout and demonstrate that acceptable traffic service levels will be maintained (LOS D or better in the peak hours) on affected Redlands arterials such as San Timoteo Canyon Road and San Bernardino Avenue.

## CAPITAL IMPROVEMENTS

Table 5 summarizes the major capital improvements that are entailed in the General Plan Circulation Element.

**Table 5**
**Proposed Roadway Capital Improvements**

| Location | Existing Lanes | Proposed Lanes | New Median | Improved Length (miles) | Comments |
|---|---|---|---|---|---|
| *Pioneer* | | | | | |
| California - Alabama* | 2 | 2 | | 1.00 | Upgrade Only |
| Alabama - Tennessee* | 2 | 2 | | 0.50 | Upgrade Only |
| Tennessee - Texas* | 2 | 2 | | 0.50 | Upgrade Only |
| Texas - Wabash | 2 | 2 | | 3.00 | Upgrade Only |
| *Palmetto/Domestic* | | | | | |
| Lugonia - California* | 0 | 4 | | 1.25 | |
| California - Alabama* | 2 | 4 | ● | 1.00 | |
| Alabama - Texas* | 2 | 2 | | 1.00 | Upgrade Only |
| *San Bernardino Ave.* | | | | | |
| Mtn View - Alabama* | 2 | 8 | ● | 2.00 | |
| Alabama - Texas* | 2 | 6 | ● | 1.00 | |
| Texas - Orange | 2 | 6 | ● | 0.50 | |
| Orange - Judson | 2 | 4 | | 1.50 | |
| Judson - Wabash | 2 | 4 | | 1.00 | |
| Wabash - Mill Creek | 0 | 4 | | 2.50 | New Road |
| *Lugonia/Mentone/Mill Creek* | | | | | |
| Mtn View - Bryn Mawr* | 0 | 4 | ● | 0.50 | |
| Bryn Mawr - Karon* | 2 | 4 | ● | 2.25 | |
| Judson - Wabash | 4 | 4 | | 0.50 | Upgrade only |
| Wabash - Crafton | 2 | 4 | | 1.00 | |
| Crafton - Garnet | 2 | 4 | | 1.30 | |
| Garnet - Bryant | 2 | 4 | | 3.00 | |
| *Redlands Blvd.* | | | | | |
| California - Alabama* | 4 | 8 | | 1.0 | |
| Alabama - Colton* | 4 | 8 | | 0.15 | |
| Orange - Central | 4 | 4 | ● | 0.25 | |
| Central - Fern | 4 | 4 | ● | 1.25 | |
| Fern - Highland | 4 | 4 | ● | 0.75 | |
| *Colton Ave.* | | | | | |
| Redlands - New York* | 4 | 4 | | 0.75 | Upgrade Only |
| New York - Orange | 2 | 4 | | 0.75 | |
| Church - Dearborn | 2 | 2 | | 1.50 | Upgrade Only |
| Wabash - Crafton | 2 | 2 | | 1.00 | Upgrade Only |

*In the East Valley Corridor Specific Plan Area.

**Table 5 (Continued)**
**Proposed Roadway Capital Improvements**

| Location | Existing Lanes | Proposed Lanes | New Median | Improved Length (miles) | Comments |
|---|---|---|---|---|---|
| *Barton/Brookside/Citrus* | | | | | |
| Judson - Wabash | 2 | 4 | | 1.00 | |
| Wabash - Crafton | 2 | 2 | | 1.00 | Upgrade Only |
| *Cypress Ave.* | | | | | |
| Redlands - Citrus | 2 | 4 | | 0.50 | |
| *Highland Ave/Fifth* | | | | | |
| Ford - Wabash | 2 | 2 | | 1.00 | Upgrade Only |
| Wabash - Crafton | 2 | 2 | | 1.00 | Upgrade Only |
| *Mountain View* | | | | | |
| I-10 Fwy - San Bernardino* | 2 | 6 | • | 0.75 | |
| *California St.* | | | | | |
| Palmetto - San Bernardino* | 0 | 6 | • | 0.50 | |
| San Bernardino - I-10 Fwy* | 2 | 6 | • | 0.75 | |
| I-10 Fwy - Barton* | 2 | 6 | • | 1.25 | |
| *Nevada St.* | | | | | |
| San Bernardino - I-10 Fwy | 2 | 4 | | 0.75 | |
| I-10 Fwy - Brookside | 2 | 4 | | 1.25 | |
| *Alabama St.* | | | | | |
| North of S. Bernardino* | 4 | 6 | • | 1.50 | |
| S. Bernardino - I-10 Fwy* | 4 | 6 | • | 0.75 | |
| I-10 Fwy - Redlands* | 4 | 6 | • | 0.25 | |
| Redlands - Barton* | 4 | 6 | • | 1.00 | |
| *Tennessee/San Mateo* | | | | | |
| S. Bernardino - Lugonia* | 0 | 6 | • | 0.50 | |
| Park - Brookside (50%) | 4 | 4 | | 0.40 | Upgrade Only |
| *Eureka* | | | | | |
| Colton - Citrus | 2 | 4 | | 0.50 | |

*In the East Valley Corridor Specific Plan Area.

**Table 5 (Continued)**
**Proposed Roadway Capital Improvements**

| Location | Existing Lanes | Proposed Lanes | New Median | Improved Length (miles) | Comments |
|---|---|---|---|---|---|
| *Texas/Center* | | | | | |
| Palmetto - Pennsylvania* | 2 | 4 | | 0.75 | |
| Pennsylvania - Colton* | 2 | 4 | | 0.75 | |
| Colton - Brookside | 2 | 4 | | 0.40 | |
| *Orange St./Cajon* | | | | | |
| North of S. Bernardino | 2 | 2 | | 1.50 | Upgrade only |
| S. Bernardino - I-10 Fwy | 2 | 4 | | 1.00 | |
| *Judson St./Ford St.* | | | | | |
| N/Pioneer - Colton | 2 | 2 | | 1.25 | Upgrade only |
| *Dearborn* | | | | | |
| N/Pioneer - Lugonia | 0 | 2 | | 1.00 | |
| *Wabash Ave.* | | | | | |
| Pioneer - S. Bernardino | 2 | 2 | | 0.40 | Upgrade Only |
| S. Bernardino - Lugonia | 2 | 2 | | 0.50 | Upgrade Only |
| Lugonia - Colton | 2 | 2 | | 0.50 | Upgrade Only |
| Colton - I-10 Fwy (50%) | 2 | 2 | | 1.25 | Upgrade Only |
| *Grafton/Sand Canyon* | | | | | |
| S. Bernardino - 5th | 2 | 2 | | 2.00 | Upgrade Only |
| *San Timoteo Cyn. Road* | | | | | |
| Barton - Fern | 0 | 4 | | 1.70 | Realignment |
| Fern - Allesandro | 2 | 4 | | 2.00 | |
| Allesandro - Live Oaks | 2 | 4 | | 1.25 | |

*In the East Valley Corridor Specific Plan Area.

# 5. Transportation Impacts of the Plan

# 5. Transportation Impacts of the Plan

This chapter describes the impacts of the recommended Circulation Element of the General Plan. Forecasting results, projected traffic volumes, levels of traffic service and improvement costs are discussed.

## TRAVEL FORECASTS

Daily traffic volumes were projected for the major street network using the City-wide traffic forecasting model developed for this study (see Chapter 3 for description). The projected traffic volumes are based on traffic generation of the land uses contained in the proposed General Plan at full build-out of the Planning Area. Travel forecast inputs, procedures and general results are described below. Specific traffic and level of service impacts are described in subsequent sections of this chapter.

### Land Uses

Smith, Peroni and Fox projected future land uses within the study area, reflecting the holding capacity of the proposed General Plan. This was done by applying General Plan densities to undeveloped parcels and adding these to the existing land use data.

The existing and projected land uses are compared in Table 6 for major land use categories. Substantial growth over present levels of activity is indicated. On the residential end, a relatively moderate increase of 36 percent is projected. Non-residential uses, however, are projected to increase by nearly four and one-half times (from 9 million square feet to over 40 million square feet). Largest percentage increases are shown for industrial and office uses, but retail increases would also be sizable. Much of the non-residential increase would be in the East Valley Corridor.

As described in Chapter 3, the model covers a large area around Redlands. Projected land uses in the areas surrounding the Redlands Planning Area are based on SCAG/RIVSAN 2010

**Table 6**
**Land Use Summary - Existing vs. Build-Out**

| Land Use | 1994 | Buildout | — Increase — Number | Ratio |
|---|---|---|---|---|
| *Residential* | | | | |
| Low Density Residential (units) | 17,300 | 23,300 | 6,000 | 1.35 |
| Medium Density Residential (units) | 8,300 | 11,400 | 3,100 | 1.37 |
| **Total** | **25,600** | **34,700** | **9,100** | **1.36** |
| *Non-Residential* | | | | |
| Retail (Million Square Feet) | 2.85 | 8.41 | 5.56 | 2.95 |
| Office (Million Square Feet) | 1.98 | 9.30 | 7.32 | 4.70 |
| Service Commercial (Million Square Feet) | 0.81 | 0.81 | 0.00 | 1.00 |
| Industrial (Million Square Feet) | 3.48 | 22.05 | 18.57 | 6.34 |
| **Total** | **9.12** | **40.57** | **31.45** | **4.45** |

NOTE: Excludes hospitals, schools, mobile homes, motels/hotels, parks and some other specific land uses.

SOURCE: Smith, Peroni and Fox

projections of travel. These projections reflect about a 49 percent increase in travel between 1994 and 2010. This is higher than the residential increase between 1994 and buildout in Redlands, but much lower than the projected increase in non-residential activities in the Planning Area.

### Trip Generation

Table 7 compares existing and future trip generation within the Redlands area, reflecting the existing and future land uses shown previously in Table 4. For modelling purposes, trip ends are classified as either "productions" (normally the home end of a trip) or "attractions" (non-home end of a trip). Each one-way trip (e.g., from home to work) has two trip ends, one of which is a production and the other an attraction. This provides an overall measure of vehicle traffic intensity in the Redlands area.

Overall, daily vehicle trip ends would more than double as a result of the land use changes between now and build-out, representing an increase of about 540,000 trip ends (or 270,000 daily vehicle trips). The percentage increase in "attractions" or non-residential trip ends would be much higher than the increase in "productions" or residential trip ends. This means that a very high proportion of the growth would have to be offset by workers, shoppers and visitors from residential areas outside Redlands.

**Table 7**
**Comparison of Existing and Build-Out Future Trip Generation**
**Daily Vehicle Trip Ends**

| | 1994 | Buildout | Increase | Ratio |
|---|---|---|---|---|
| Trip ends produced[1] | 249,600 | 403,400 | 153,800 | 1.62 |
| Trip ends attracted[2] | 218,300 | 604,300 | 386,000 | 2.77 |
| **Total Trip Ends** | **467,900** | **1,007,700** | **539,800** | **2.15** |

[1] Typically related to homes.
[2] Typically related to non-residential activities such as offices and commercial sites.

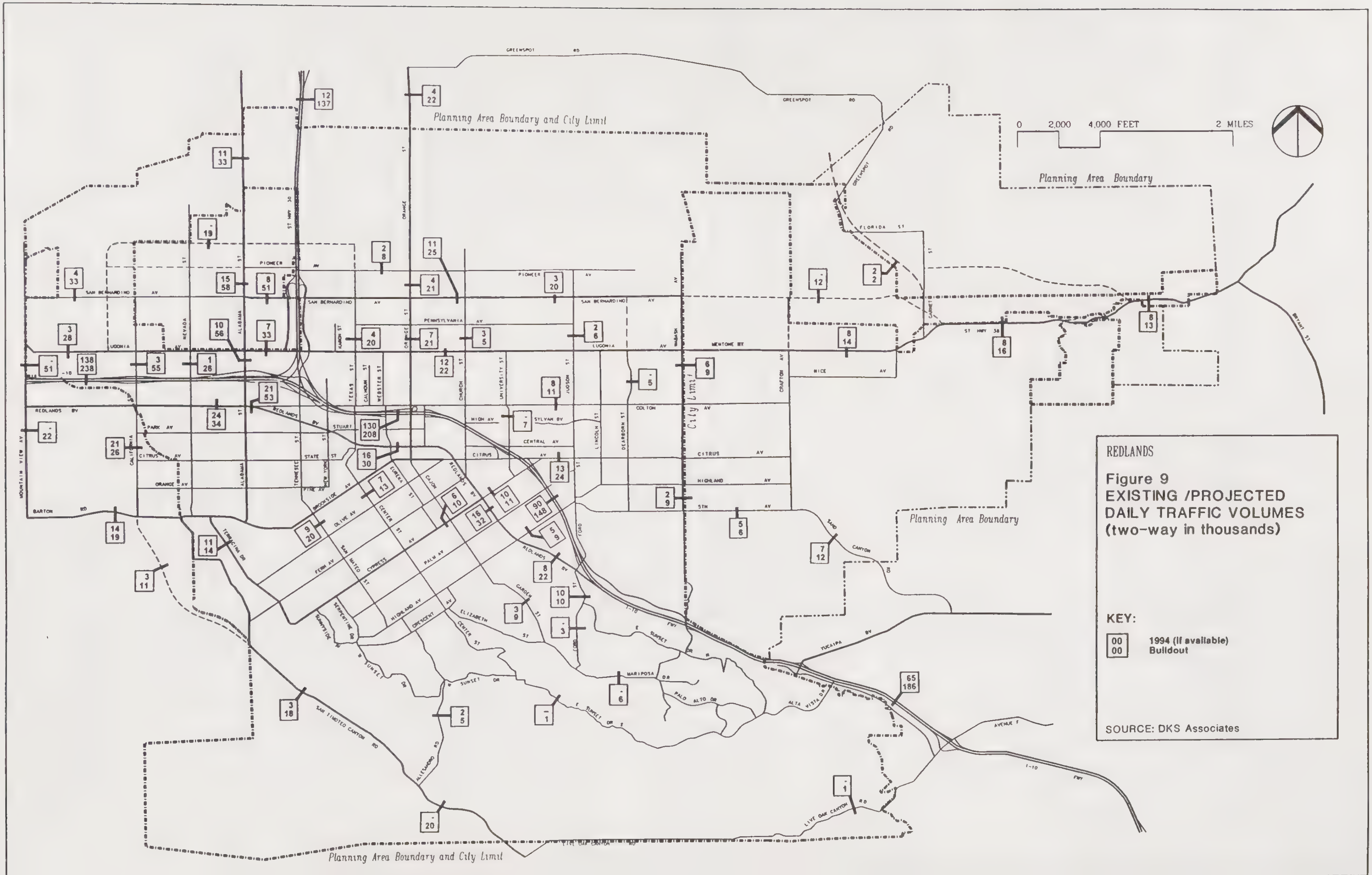
## PROJECTED TRAFFIC VOLUMES

Future traffic volumes were projected based on the land use forecasts using the traffic model described above (Figure 9). The volumes represent two-way total daily volumes. They are referred to as buildout volumes because they assume full buildout of all developable land in the Redlands Planning Area (as shown previously in Table 6). Also shown for comparison are 1994 daily traffic volumes.

The projected volumes are based on a capacity-constrained assignment of future trips to the baseline future network. Since the trip assignment process considers roadway capacities in choice of routes, the projected volumes do not necessarily reflect unconstrained travel desires on each facility. Rather they represent the results of redistributing trips among available routes within corridors of travel.

The figure shows that sizable traffic increases are projected throughout Redlands at buildout. In some cases, existing low volume streets are projected to carry heavy volumes of traffic characteristic of major arterial highways. In general, greatest percentage and numerical increases in traffic are projected on the primary north-south freeway access routes in the northwest sector of the city. Review of trip generation results indicates that this is attributable to potential employment growth in the East Valley Corridor. For example, the largest traffic zone (north of Lugonia Avenue, between Alabama and SR 30) is projected to generate over 67,000 vehicle trip ends by itself, and lack of residential uses in the area limits the potential for local ("intra-zonal") trips. Specific observations from the figure include:

- All three I-10 freeway access routes on the west side of Redlands (Alabama, California and Mountain View) would be heavily utilized at buildout, carrying 50,000 or more daily vehicles. In particular, Alabama, with up to 66,000 daily


REDLANDS
Figure 9
EXISTING /PROJECTED
DAILY TRAFFIC VOLUMES
(two-way in thousands)
KEY:
00
00
1994 (if available)
Buildout
SOURCE: DKS Associates
0 2,000 4,000 FEET 2 MILES
Planning Area Boundary and City Limit
Planning Area Boundary
City Limit
GREENSPOT RD
PIONEER AV
SAN BERNARDINO AV
PENNSYLVANIA AV
LUGONIA AV
MENTONE BV
RICE AV
REDLANDS BV
STUART
STATE ST
CITRUS AV
HIGHLAND AV
5TH AV
BARTON RD
ORANGE AV
PARK AV
SYLVAN BV
CENTRAL AV
HIGH AV
OLIVE AV
FERN AV
BROOKSIDE AV
PALM AV
CRESCENT
ELIZABETH
CENTER ST
SUNSET DR
MARIPOSA DR
PALO ALTO DR
ALTA VISTA DR
TUCAIPA BV
AVENUE F
SAN TIMOTEO CANYON RD
LIVE OAK CANYON RD
SAND CANYON RD
ALESSANDRO RD
I-10 FWY
ST HWY 30
ST HWY 38
MOUNTAIN VIEW AV
CALIFORNIA
ALABAMA
NEVADA
TENNESSEE
TEXAS ST
CALHOUN ST
WEBSTER ST
ORANGE ST
CHURCH ST
UNIVERSITY ST
JUDSON ST
LINCOLN ST
DEARBORN ST
WABASH AV
CRAFTON AV
GARNET
FLORIDA ST
BRYANT ST
COLTON AV
EUREKA
CAJON
CYPRESS
SAN MATEO ST
FORD
TERRACINA DR

vehicles, is projected to carry more traffic than any other non-freeway route in Redlands.

- Sizable traffic increases are also projected in the northeast sector of the city, although projected levels are generally much lower than to the west. Traffic volumes of 10-30,000 daily vehicles are projected on most primary north-south routes east of SR 30.

- Traffic increases in the established areas of Redlands between Brookside and Highland are lower than elsewhere, but nevertheless significant at some locations.

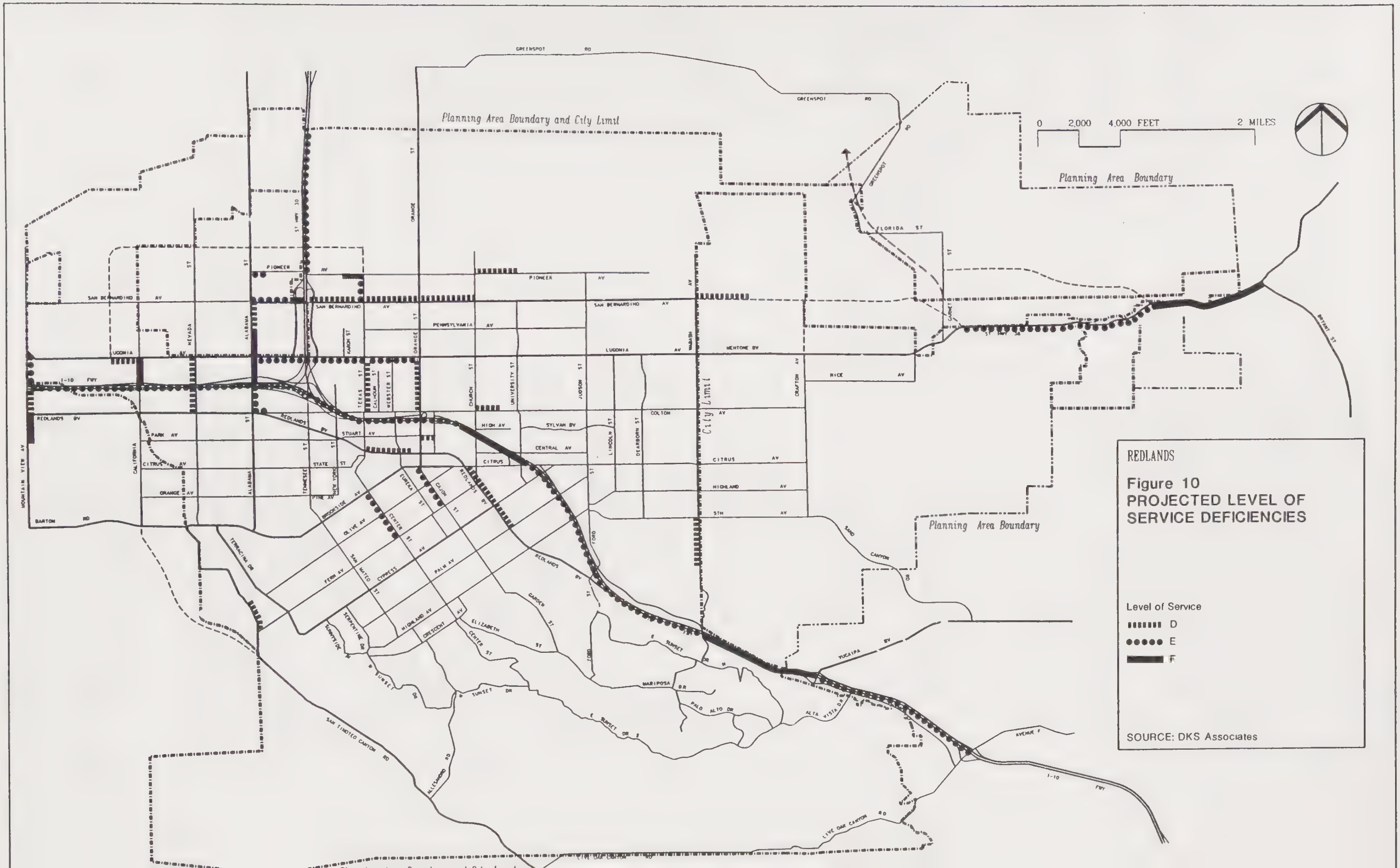
- A number of existing residential collector streets are projected to carry traffic volumes above desirable levels for such streets.

- Substantial traffic increases on area freeways are projected. The I-10 freeway is projected to carry up to about 238,000 daily vehicles near California Street. On the west side of Redlands, this is an increase of 70 percent over present levels while on the east end, I-10 traffic is projected to double due to higher than average regional growth forecasts toward the east. The SR 30 freeway is similarly projected to carry about double the current traffic volumes.

## FUTURE LEVELS OF SERVICE

Future traffic service levels were determined for each roadway segment by comparing its projected daily traffic volume to the estimated capacity of the roadway and then translating the resulting volume/capacity ratio into a more subjective measure of level of service (LOS) from A to F. The higher the volume/capacity ratio, the poorer the level of service. (See Chapter 2 for a complete description.) LOS A, B and C indicate satisfactory conditions where traffic can move relatively freely. LOS D describes conditions where delay is more noticeable, and average travel speeds may be as low as 40 percent of the free flow speed. This level of service is recommended as the minimum standard for Redlands. LOS E indicates unacceptable conditions with significant delays and average travel speeds of one-third the free flow speed or lower; traffic volumes are at or close to capacity. LOS F characterizes arterial flow at very slow speeds (stop-and-go), and large delays (over a minute) and queuing at signalized intersections, and is clearly an unacceptable traffic condition.

Figure 10 displays projected levels of service for the recommended circulation plan. Only LOS D, E and F locations are shown; all other routes are projected to operate satisfactorily at LOS C or better at build-out. Table 8 summarizes existing and future traffic volumes and resulting levels of service on the arterial system, while Table 9 lists traffic volumes and levels of service for the regional freeway system. Although the LOS estimates are based on daily volume projections, they represent peak hour conditions assuming normal peaking of traffic. During other hours, better LOS would usually prevail.



Planning Area Boundary and City Limit
0 2,000 4,000 FEET 2 MILES
Planning Area Boundary
City Limit
REDLANDS
Figure 10
PROJECTED LEVEL OF
SERVICE DEFICIENCIES
Level of Service
D
E
F
SOURCE: DKS Associates

**Table 8**
**Arterial System Volumes and Levels of Service**

| Location | ---- Existing 1994 ---- Lanes | ADT | LOS | ------ Buildout ------ Lanes | ADT | LOS |
|---|---|---|---|---|---|---|
| *Palmetto* | | | | | | |
| California - Alabama | 2 | <1,000 | A | 4 | 19,000 | A |
| *San Bernardino Ave.* | | | | | | |
| Mtn View - Alabama | 2 | 4,000 | A | 6 | 28-33,000 | A-B |
| Alabama - Orange | 2 | 8,000 | A | 6 | 40-51,000 | C-E |
| Orange - Church | 2 | 11,000 | C | 4 | 25,000 | D |
| Church - Wabash | 2 | 3,000 | A | 4 | 15-24,000 | A-C |
| Wabash - Mill Creek | 2 | 2,000 | A | 4 | 11-12,000 | A |
| *Lugonia Ave./Mentone Blvd.* | | | | | | |
| Mtn View - Alabama | 2 | 3,000 | A | 4 | 22-30,000 | B-D |
| Alabama - Orange | 2 | 7,000 | A | 4 | 32-36,000 | E |
| Orange - Wabash | 4 | 12,000 | A | 4 | 13-22,000 | A-C |
| Wabash - Garnet | 4 | 8,000 | A | 4 | 10-19,000 | A-B |
| *Redlands Blvd.* | | | | | | |
| California - Alabama | 4 | 20,000 | A | 6 | 34-39,000 | B-C |
| Alabama - Colton | 4 | 21,000 | A | 6 | 53,000 | E |
| Colton - Texas | 4 | 14-19,000 | A | 6 | 33,000 | B |
| Texas - Citrus | 4 | 13-27,000 | A | 4 | 28-30,000 | C-D |
| Citrus - Highland | 4 | 8-16,000 | A | 4 | 28-32,000 | C-D |
| Highland - I-10 Fwy | 4 | 8,000 | A | 4 | 22,000 | B |
| *Colton Ave.* | | | | | | |
| Redlands - Sixth | 2 | -- | -- | 4 | 17-23,000 | A-C |
| Sixth - University | 2 | 10,000 | B | 2 | 10-12,000 | B-D |
| University - Dearborn | 2 | 8,000 | A | 2 | 9-11,000 | B-C |
| Dearborn - Crafton | 2 | 2-6,000 | A | 2 | 5-9,000 | A |
| *Barton/Brookside/Citrus* | | | | | | |
| California - Terracina | 4 | 16,000 | A | 6 | 25-33,000 | A-B |
| Terracina - Orange | 4 | 14,000 | A | 4 | 18-27,000 | A-C |
| Orange - Judson | 4 | 13,000 | A | 4 | 16-24,000 | A-C |
| Judson - Wabash | 4 | 16,000 | A | 4 | 8-14,000 | A |
| Wabash - Crafton | 2 | 4,000 | A | 2 | 4-10,000 | A-B |
| *Cypress Ave.* | | | | | | |
| Terracina - Citrus | 4 | 6-9,000 | A | 4 | 8-12,000 | A |
| *California St.* | | | | | | |
| Palmetto - Lugonia | 2 | <1,000 | A | 6 | 31-40,000 | A-C |
| Lugonia - Redlands | 2 | 4,000 | A | 6 | 33-58,000 | B-F |
| Redlands - Barton | 2 | 7,000 | A | 6 | 22-23,000 | A |

**Table 8 (Continued)**
**Arterial System Volumes and Levels of Service**

| Location | ---- Existing 1994 ---- | | | ------ Buildout ------ | | |
|---|---|---|---|---|---|---|
| | Lanes | ADT | LOS | Lanes | ADT | LOS |
| *Nevada* | | | | | | |
| San Bernardino - Lugonia | 2 | <1,000 | A | 4 | 18-22,000 | B-C |
| Lugonia - Redlands | 2 | 4,000 | A | 4 | 26,000 | D |
| Redlands - Barton | 2 | 1,000 | A | 4 | 11-18,000 | A-B |
| *Alabama St./Palm* | | | | | | |
| North of S. Bernardino | 4 | 11,000 | A | 6 | 20-38,000 | A-C |
| S. Bernardino - I-10 Fwy | 4 | 10-15,000 | A | 6 | 45-58,000 | D-F |
| I-10 Fwy - Redlands | 4 | 27,000 | D | 6 | 47,000 | D |
| Redlands - Barton | 4 | 13-21,000 | A-B | 6 | 16-37,000 | A-B |
| *Tennessee/San Mateo* | | | | | | |
| Lugonia - Brookside | 4 | 14,000 | A | 4 | 13-29,000 | A-E |
| Brookside - Highland | 4 | 9,000 | A | 4 | 11-20,000 | A-B |
| *Texas/Center* | | | | | | |
| Pioneer - Colton | 2 | 4,000 | A | 4 | 20-28,000 | B-E |
| Colton - Brookside | 4 | 11,000 | A | 4 | 14-18,000 | A |
| Brookside - Highland | 2 | -- | -- | 2 | 10-13,000 | C-E |
| *Eureka St.* | | | | | | |
| Pearl-Citrus | 2 | 4,000 | A | 4 | 10,000 | A |
| *Orange St./Cajon* | | | | | | |
| North of Pioneer | 2 | 4,000 | A | 4 | 22,000 | A |
| Pioneer - Lugonia | 2 | 7,000 | A | 4 | 19-21,000 | B-C |
| Lugonia - I-10 Fwy | 4 | 17,000 | B | 4 | 25-27,000 | D |
| I-10 Fwy - Citrus | 4 | 22,000 | C | 4 | 21,000 | B |
| Citrus - Highland | 2 | 12,000 | C | 2 | 9-14,000 | B-E |
| Highland - Elizabeth | 2 | -- | -- | 2 | 9,000 | B |
| *Judson St./Ford St.* | | | | | | |
| Pioneer - Colton | 2 | 2,000 | A | 2 | 5-8,000 | A |
| Colton - I-10 Fwy | 2 | 5,000 | A | 2 | 7-10,000 | A-B |
| *Wabash Ave.* | | | | | | |
| Pioneer - Lugonia | 2 | 2,000 | A | 2 | 3-7,000 | A |
| Lugonia - Citrus | 2 | 6,000 | A | 2 | 7-9,000 | A-B |
| Citrus - I-10 Fwy | 2 | 2,000 | A | 2 | 7-13,000 | A-D |
| *Crafton* | | | | | | |
| San Bernardino - 5th | 2 | 4-6,000 | A | 2 | 3-9,000 | A |
| *Sand Canyon* | | | | | | |
| East of Crafton | 4 | 7,000 | A | 4 | 12,000 | A |
| *San Timoteo Cyn. Road* | | | | | | |
| Barton - Allesandro | 2 | 3,000 | A | 2 | 11-18,000 | B-C |
| Allesandro - Live Oaks | 2 | -- | -- | 2 | 20,000 | C |

ADT = Average daily traffic volume; ranges indicate lowest and highest volumes in the segment.

**Table 9**
**Freeway Volumes and Levels of Service**

| Location | Existing 1994 Lanes | Existing 1994 ADT | Existing 1994 LOS | Buildout Lanes | Buildout ADT | Buildout LOS |
|---|---|---|---|---|---|---|
| *Interstate 10* | | | | | | |
| Mountain View - California | 8 | 138,000 | C | 10 | 238,000 | E |
| California - Alabama | 8 | 140,000 | C | 10 | 235,000 | E |
| Alabama - SR 30 | 8 | 140,000 | C | 10 | 205,000 | D |
| SR 30 - Orange | 8 | 130,000 | C | 8 | 208,000 | F |
| Orange - University | 6 | 104,000 | C | 8 | 206,000 | F |
| University - Cypress | 6 | 87,000 | C | 8 | 195,000 | E |
| Cypress - Ford | 6 | 90,000 | C | 8 | 198,000 | E |
| Ford - Redlands | 6 | 82,000 | C | 8 | 210,000 | F |
| Redlands - Wabash | 6 | 87,000 | C | 8 | 186,000 | E |
| Wabash - Yucaipa | 6 | 88,000 | C | 8 | 180,000 | E |
| *State Route 30* | | | | | | |
| I-10 - San Bernardino | 4 | 46,000 | B | 4 | 85,000 | D |
| North of San Bernardino | 4 | -- | -- | 4 | 92,000 | D |

The plan has generally been designed to keep peak hour traffic service levels at or above LOS D at all times and locations, limiting the duration of LOS D conditions to no more than three hours of the day. During other times, LOS C or better conditions are the goal of the city. At a number of locations, the buildout of the General Plan is projected to degrade traffic service levels relative to existing service levels. Also, at a number of locations, LOS E and F are projected to occur by buildout. Through policies of the General Plan (Section 5.20), it is the intent to monitor traffic growth and levels of service and to make changes needed to maintain an acceptable level of service in the future. These changes may include traffic demand management strategies, traffic control measures, and land use and intensity changes.

## ANALYSIS OF GENERAL PLAN TRAFFIC IMPACTS

This section describes traffic impacts and potential mitigation for specific components of the Redlands circulation system, with emphasis on key traffic planning issues and needs. Where traffic impacts are described which drop the level of service below the acceptable levels of service called for in the policies of the General Plan, additional changes will be needed and may include traffic demand management strategies, traffic control measures, and land use and intensity changes. The following analysis and descriptions do not incorporate these changes. Rather, the analysis shows potential future impacts should these changes not occur.

## Arterial System

Table 8 compares existing and projected traffic volumes and levels of service on arterials within Redlands. Key impacts and issues include the following:

**San Bernardino Avenue.** This is the only local access route to and from the SR 30 freeway, and it would serve some of the highest traffic generating uses in the East Valley Corridor. Congestion is projected between Alabama Street and Church Street even with widening to six lanes. On the east end, San Bernardino is proposed to be extended to connect to Mill Creek Road; in the absence of this extension, higher traffic volumes and LOS F conditions are projected along much of the length of Lugonia Avenue.

**Lugonia Avenue.** Due to right-of-way constraints and residential impacts, this route is not proposed to be widened beyond 4 lanes. Consequently, deficient levels of service are projected on portions of the road near Route 30. However, relatively modest reductions in traffic due to TDM and/or transit usage or land use changes in the East Valley Area would achieve acceptable service (LOS D) at most locations.

**Redlands Boulevard.** Within the East Valley Corridor, Redlands Boulevard would be widened to 6 lanes; elsewhere, it would remain four lanes wide. In general, acceptable level of service is projected. The key exception is the Redlands/Alabama intersection (which is already deficient) and the segment east to Colton; localized intersection/lane improvements appear necessary here in the future to avoid a major bottleneck to downtown traffic.

**Colton Avenue.** West of Sixth Street, Colton is proposed to be widened to four lanes in the East Valley Corridor Specific Plan; to the east the existing two lanes would be retained due to right-of-way constraints and land use issues, and would be sufficient.

**Mountain View Avenue.** North of I-10, up to 51,000 daily vehicles are projected. With proposed widening to six lanes, as well as related interchange improvements, acceptable traffic conditions (LOS D or better) could be achieved. However, LOS F is projected on portions of the road south of I-10, which is outside the Redlands Planning Area and the East Valley Specific Plan Area. However, these traffic projections may be conservative since the traffic model does not include a detailed representation of streets in Loma Linda. Should such traffic increases occur, widening to six lanes consistent with the planned width north of I-10 would be necessary. Future traffic levels should be monitored here as development occurs in the East Valley area.

**California Street.** Even with widening to six lanes, deficient conditions (LOS F) would occur in the vicinity of the I-10 freeway where traffic volumes of up to 55,000 daily vehicles are projected. This will necessitate freeway interchange improvements, including potential ramp reconfiguration or widening. Traffic congestion would be localized and would impact

only commute period traffic to/from nearby employment sites; therefore, LOS E may be acceptable during peak hours. Future traffic levels should be monitored here.

**Alabama Street.** This is projected to have the highest traffic volumes of any arterial street in Redlands, with up to 58,000 daily vehicles north of I-10. Even with widening to six lanes, deficient conditions (LOS F) would occur in the vicinity of Lugonia Avenue and the I-10 freeway. This would necessitate freeway interchange improvements, including potential ramp reconfiguration or widening. Consideration should also be given to restricting access and providing four travel lanes in each direction between I-10 and Lugonia to maximize roadway capacity. Future traffic levels should be monitored here.

**Texas Street.** Due to right-of-way constraints and presence of the freeway underpass to the south, widening beyond four lanes is not proposed. A relatively modest reduction in peak period traffic and, where possible, localized intersection improvements may achieve adequate level of service. Traffic service should be monitored here as the East Valley builds out.

**Orange Street.** Widening to four lanes is proposed between Colton and San Bernardino; even so a relatively modest reduction in peak period traffic and, where possible, localized intersection improvements would be necessary to maintain adequate level of service.

**Crafton Street.** Projected traffic levels on Crafton are generally under 9,000 daily vehicles, which can be easily accommodated on the existing two-lane roadway. However, depending on the traffic speeds on the roadway, higher volumes are possible. Due to the fronting uses along Crafton, these higher volumes would not be desirable. Accordingly, traffic growth should be monitored and, if necessary, measures should be implemented (such as stop signs, intersection lane narrowing, speed enforcement) to discourage non-local traffic.

**San Timoteo Canyon Road.** Traffic growth on San Timoteo Canyon Road is attributable not only to Oak Valley development to the south, but also to projected employment growth in the East Valley Corridor. San Timoteo Canyon Road may also become an alternative travel route for some trips if the I-10 freeway becomes overloaded in the future. The projected traffic volumes could be accommodated at an adequate level of service if San Timoteo continues to operate similar to a highway, with limited numbers of intersections and access points. Further growth south of Redlands may require widening to four lanes.

The North-South Transportation Corridor Study by SANBAG was discontinued in 1994. That study would have addressed future needs and alternatives for the general north-south corridor between I-10 and Route 60, including San Timoteo Canyon Road, in more detail.

**Mill Creek-Greenspot Connection.** The Circulation Element proposes an improved connection between Mill Creek Road (Route 38) and Greenspot Road to the north, for access to Highland. This is an important connection to reduce future traffic loadings on San Bernardino Avenue and, to a lesser degree, on Lugonia Avenue. A realignment of Garnet Street and Florida Street to provide a more direct, higher speed arterial route is assumed, but

no route studies have been made. Due to the presence of the Santa Ana Wash, alternatives may need to be considered such as a northerly extension of Wabash. Further multi-jurisdictional studies are needed to define the type, location, schedule and funding of this connection.

**Collector Streets**

Although traffic increases primarily affect the major arterial routes, there will be more traffic on several collector streets. Of particular interest are those fronted by residences. For these streets, traffic volumes tend to be the more critical measure of acceptability rather than capacity-based level of service. While two-lane collector streets often have capacity for up to 10,000 daily vehicles, limits of acceptance to fronting residents are usually much lower, on the order of 3,000 daily vehicles. Residential streets with more than 5,000 daily vehicles are of particular concern to residents living along them. It should be noted that several of the existing collector streets already carry 5,000 or more vehicles.

Build-out of the General Plan is anticipated to increase traffic volumes on several existing residential collector streets in Redlands. Projected volumes on most collectors are shown in Figure 9 earlier in this chapter. Key impacts of the General Plan based on the model results are as follows:

- In the hillside area of south Redlands, segments of Allesandro, Garden, Elizabeth and Mariposa are projected to carry over 3,000 daily vehicles. It would be desirable to provide a good connection to I-10 at Ford to minimize traffic on hillside collector streets.

- Brockton Avenue also has the potential for higher than acceptable traffic volumes in the future (up to 8,000 daily vehicles near Texas and Orange streets). This appears to be due to traffic growth associated with the East Valley area and projected congestion on parallel arterials such as Lugonia Avenue and San Bernardino Avenue. Traffic management measures may be needed to discourage through traffic on Brockton Avenue, but these may further increase traffic on Colton Avenue.

- Pioneer Avenue is projected to attract undesirably high levels of traffic (15,000 daily vehicles) on its west end where it would collect traffic to/from the East Valley area. Traffic management may be necessary on the east end. Reclassification of Pioneer Avenue to a two-lane minor arterial may be necessary west of Church Street since there are no good opportunities for redirecting traffic to other parallel routes.

- In the East Valley Corridor area, which is non-residential, higher traffic levels on collector streets would be acceptable. Nevertheless, opportunities should be sought for adding north-south collectors south of I-10 to complement east-west routes such as Citrus, Park and Orange.

Traffic levels on the above residential collector streets should be monitored by the City and, if requested by the residents and warranted by the traffic volumes, the City should consider alternative traffic control measures to limit the increases. These measures could include additional traffic signals or stop signs, traffic diverters, and other similar treatments to discourage traffic and reduce vehicular speeds.

**Freeway Impacts**

Although the primary intent of the city-wide model is to project traffic levels on arterial and collector streets, it also provides rough estimates of freeway traffic loadings. Since these are highly dependent on regional growth patterns, some caution must be exercised in using the projections. The projections are generally consistent with past studies that show very substantial potential traffic growth on I-10 and SR 30 in the long-range future as a consequence of population and employment growth along the entire corridor. However, the projections are somewhat higher than recent SCAG/CTP projections for 2010, since the General Plan analysis addresses full buildout of the entire Redlands planning area beyond the 2010 SCAG/CTP horizon year. Based on the buildout analysis, the following freeway impacts are observed:

The I-10 freeway is projected to carry on the order of 200,000 daily vehicles through Redlands, with up to 238,000 daily vehicles west of SR 30. On the west end of Redlands, I-10 traffic is projected to increase by 70 percent over present levels. East of Redlands, I-10 traffic is projected to double. This reflects the higher than average regional growth forecasts for areas east of Redlands, along with assumed development in the Oak Valley area.

These projections assume widening of the I-10 freeway to incorporate HOV lanes, for a total of 10 lanes west of SR 30 and 8 lanes east of SR 30. These additional lanes are proposed in Caltrans' *I-10 Route Concept Report* but are not included in the *Regional Mobility Plan* or in the SCAG/CTP assumptions for 2010. The projected traffic volumes along I-10 would be above the desirable carrying capacity of an eight-lane freeway. In the absence of this widening, many of the projected freeway trips would divert to city streets such as Redlands Boulevard.

While anticipated growth in the Redlands Planning Area contributes significantly to the projected freeway traffic increases, much of the increase is associated with through traffic and will occur regardless of the levels of growth in Redlands.

Implementation of high-quality commuter transit services extending to Redlands could potentially postpone or even avoid the need for freeway widening. The projected traffic levels underscore the need for continued efforts to implement regional transit service improvements such as commuter rail, as well as consideration for widening the I-10 freeway to eight lanes plus HOV lanes in the long-range future.

## ESTIMATED IMPROVEMENT COSTS

General cost estimates were prepared for each of the street improvements included in the recommended General Plan Circulation Element. These cost estimates are based on generalized right-of-way and construction costs and do not reflect any detailed engineering work. They are intended only to provide a basis for evaluating relative costs and benefits associated with the General Plan land uses. They should not be used for project planning.

Table 10 presents estimated costs for each of the improvements. Costs are shown separately for roadway widening, roadway upgrading (frontage improvements for unimproved roads), medians and right-of-way. Roadway improvement costs within the East Valley Corridor Specific Plan area are also broken out separately, and amount to about half the total cost of $109 million. (This does not include East Valley Corridor costs outside the Redlands Planning Area.)

**Table 10**
**Redlands General Plan – Cost of Improvements***

| Improvements | Cost ($ Millions) |
|---|---|
| Added Lanes | $55.2 |
| New Medians | $10.0 |
| Upgrades | $9.5 |
| Additional ROW | $34.4 |
| **TOTAL**** | **$109.1** |
| EVCSP AREA TOTAL COST | $53.6 |

*Excludes freeway/freeway interchange costs. Excludes structural costs (e.g., RR grade separations, freeway overpasses/underpasses. Excludes cost of Class I bike paths. Excludes landscaping costs, if any.

**Includes East Valley Corridor Specific Plan area costs within Redlands Planning Area.

The costs do not include costs for freeway widening or freeway interchange improvements, underpass or overpass widening or railroad grade separations. Landscaping costs are also omitted. These costs may be substantial. For example, major freeway interchange improvements typically cost on the order of $10-$25 million, and improvements will potentially be necessary at several interchanges in Redlands (e.g., I-10/Mountain View, I-10/California).

The costs as shown assume certain values for right-of-way costs and acquisition ($10-15 per square foot in built-up areas, $2 per square foot in the East Valley Corridor and other undeveloped areas). These right-of-way costs would be significantly reduced for many of the improvement projects if right-of-way were dedicated by adjacent development projects.

## TDM/TRANSIT IMPACTS

The projected volumes do not include any allowance for traffic reduction due to the proposed TDM program in Redlands. During the P.M. peak period, a commute traffic reduction of up to 15 percent could potentially occur at larger office developments (say over 50,000 square feet in size). However, since commute trips account for only a portion of all trips during peak periods, and since many trips are associated with retail uses, small employers and other activities not as susceptible to traffic reduction, the net effect on roadways would be less--perhaps on the order of 5 percent. Some of the reduction would occur even in the absence of a formal TDM program due to the tendency for spreading of commute traffic beyond the peak hour. This effect would not represent an actual reduction of traffic over the full day.

Due to the uncertainty regarding the nature, timing and ridership potential of regional transit service improvements, no allowance has been made for potential traffic reductions due to increased transit share. Should these types of improvements be implemented, traffic loadings would be lower than those shown, and traffic service levels would potentially be improved in the peak periods.

# APPENDIX A
# Existing (1994) Land Uses and Trip Generation

Table 1

LAND USE INPUTS

BL2: Redlands Buildout (Revised 6/20/95)

| TRAFFIC ZONE | RESIDENTIAL Low Density Units | RESIDENTIAL Med Density Units | RESIDENTIAL Mbl Homes Units | RETAIL Low KSF | RETAIL Medium KSF | RETAIL High KSF | HOTEL Rooms | OFFICE KSF | SERVICE KSF |
|---|---|---|---|---|---|---|---|---|---|
| 1 Redlands | 0 | 0 | 0 | 114.110 | 0.000 | 0.000 | 0 | 823.430 | 0.000 |
| 2 Redlands | 0 | 0 | 0 | 113.330 | 0.000 | 0.000 | 0 | 817.220 | 0.000 |
| 3 Redlands | 0 | 0 | 0 | 203.370 | 5.200 | 0.000 | 0 | 524.040 | 0.000 |
| 4 Redlands | 0 | 0 | 0 | 200.270 | 5.120 | 0.000 | 0 | 494.310 | 0.000 |
| 5 Redlands | 401 | 8 | 180 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 6 Redlands | 1,190 | 46 | 2 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 7 Redlands | 167 | 15 | 0 | 0.000 | 0.000 | 0.000 | 0 | 129.373 | 0.000 |
| 8 Redlands | 434 | 0 | 3 | 57.210 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 9 Redlands | 791 | 131 | 272 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 4.600 |
| 10 Redlands | 144 | 457 | 2 | 0.000 | 40.000 | 0.000 | 0 | 40.000 | 0.000 |
| 11 Redlands | 490 | 193 | 4 | 0.000 | 0.000 | 0.000 | 0 | 10.000 | 0.000 |
| 12 Redlands | 134 | 2 | 0 | 611.090 | 0.000 | 0.000 | 0 | 419.230 | 0.000 |
| 13 Redlands | 0 | 0 | 0 | 1,850.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 14 Redlands | 0 | 0 | 0 | 211.140 | 0.000 | 0.000 | 0 | 676.880 | 0.000 |
| 15 Redlands | 0 | 0 | 0 | 113.330 | 0.000 | 0.000 | 0 | 823.430 | 0.000 |
| 16 Redlands | 0 | 0 | 0 | 138.470 | 9.950 | 0.000 | 0 | 1,225.840 | 0.000 |
| 17 Redlands | 0 | 0 | 0 | 469.310 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 18 Redlands | 0 | 0 | 0 | 137.230 | 0.000 | 0.000 | 0 | 254.060 | 37.000 |
| 19 Redlands | 0 | 0 | 0 | 149.250 | 8.290 | 0.000 | 0 | 434.830 | 12.000 |
| 20 Redlands | 0 | 0 | 0 | 80.160 | 1.550 | 0.000 | 0 | 0.000 | 9.801 |
| 21 Redlands | 54 | 233 | 0 | 221.290 | 0.000 | 1.310 | 0 | 163.540 | 12.920 |
| 22 Redlands | 594 | 63 | 3 | 39.140 | 1.394 | 0.000 | 0 | 29.192 | 61.909 |
| 23 Redlands | 425 | 699 | 1 | 20.520 | 16.380 | 0.440 | 0 | 0.000 | 8.494 |
| 24 Redlands | 0 | 414 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 25 Redlands | 45 | 448 | 1 | 0.700 | 0.000 | 0.000 | 0 | 0.000 | 1.307 |
| 26 Redlands | 1,090 | 127 | 120 | 0.000 | 50.000 | 0.000 | 0 | 0.000 | 0.000 |
| 27 Redlands | 760 | 124 | 308 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 28 Redlands | 603 | 41 | 1 | 0.000 | 60.000 | 0.000 | 0 | 0.000 | 0.000 |
| 29 Redlands | 533 | 1 | 15 | 37.310 | 0.000 | 0.000 | 0 | 38.470 | 27.500 |
| 30 Redlands | 650 | 689 | 0 | 60.000 | 0.000 | 0.000 | 0 | 0.000 | 48.267 |
| 31 Redlands | 141 | 49 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 23.000 |
| 32 Redlands | 38 | 142 | 0 | 308.840 | 110.000 | 32.850 | 0 | 586.740 | 38.295 |
| 33 Redlands | 0 | 152 | 0 | 48.970 | 0.000 | 0.000 | 250 | 227.770 | 16.801 |
| 34 Redlands | 0 | 0 | 0 | 84.071 | 2.178 | 0.000 | 66 | 0.000 | 20.599 |
| 35 Redlands | 0 | 0 | 0 | 316.620 | 139.650 | 0.000 | 0 | 48.352 | 5.227 |
| 36 Redlands | 0 | 0 | 0 | 183.340 | 38.310 | 0.740 | 0 | 0.000 | 40.511 |
| 37 Redlands | 0 | 0 | 0 | 379.610 | 5.430 | 5.010 | 0 | 0.000 | 203.267 |
| 38 Redlands | 0 | 108 | 0 | 80.430 | 7.210 | 0.000 | 0 | 139.550 | 3.267 |
| 39 Redlands | 21 | 639 | 1 | 105.150 | 4.660 | 0.000 | 0 | 136.620 | 60.000 |
| 40 Redlands | 0 | 0 | 0 | 278.610 | 0.000 | 0.000 | 0 | 155.250 | 28.750 |
| 41 Redlands | 0 | 8 | 0 | 199.460 | 0.000 | 0.000 | 0 | 118.250 | 7.187 |
| 42 Redlands | 10 | 1,461 | 0 | 92.130 | 0.000 | 0.000 | 0 | 155.700 | 10.000 |
| 43 Redlands | 44 | 1,173 | 2 | 103.660 | 0.000 | 0.000 | 0 | 188.700 | 26.136 |
| 44 Redlands | 288 | 352 | 0 | 144.060 | 8.973 | 5.750 | 0 | 187.620 | 1.960 |
| 45 Redlands | 155 | 803 | 0 | 18.208 | 0.000 | 0.000 | 0 | 92.776 | 1.307 |
| 46 Redlands | 234 | 204 | 0 | 0.000 | 150.000 | 0.000 | 0 | 9.148 | 0.000 |

Table 1
LAND USE INPUTS
BL2: Redlands Buildout (Revised 6/20/95)

| TRAFFIC ZONE | RESIDENTIAL Low Density Units | RESIDENTIAL Med Density Units | RESIDENTIAL Mbl Homes Units | RETAIL Low KSF | RETAIL Medium KSF | RETAIL High KSF | HOTEL Rooms | OFFICE KSF | SERVICE KSF |
|---|---|---|---|---|---|---|---|---|---|
| 47 Redlands | 372 | 6 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 48 Redlands | 477 | 231 | 1 | 0.000 | 0.000 | 0.000 | 0 | 58.910 | 0.000 |
| 49 Redlands | 722 | 116 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 10.000 |
| 50 Redlands | 418 | 27 | 0 | 15.682 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 51 Redlands | 934 | 738 | 0 | 30.318 | 0.000 | 0.000 | 0 | 116.800 | 5.881 |
| 52 Redlands | 417 | 2 | 1 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 53 Redlands | 1,126 | 6 | 3 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 54 Redlands | 289 | 1 | 8 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 55 Redlands | 1,245 | 13 | 0 | 0.000 | 0.000 | 0.000 | 0 | 52.910 | 0.000 |
| 56 Redlands | 756 | 2 | 7 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 57 Redlands | 471 | 2 | 0 | 0.261 | 0.000 | 0.000 | 0 | 0.000 | 2.000 |
| 58 Redlands | 1,087 | 62 | 1 | 0.000 | 0.000 | 0.000 | 0 | 122.050 | 8.494 |
| 59 Redlands | 462 | 5 | 2 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 6.000 |
| 60 Redlands | 819 | 6 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 61 Redlands | 130 | 0 | 1 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 62 Redlands | 599 | 33 | 0 | 150.670 | 11.420 | 0.000 | 0 | 0.000 | 49.000 |
| 63 Redlands | 824 | 389 | 1 | 79.730 | 2.570 | 0.000 | 0 | 0.000 | 13.148 |
| 64 Redlands | 55 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 65 Redlands | 361 | 29 | 177 | 41.382 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 66 Redlands | 424 | 1 | 1 | 0.087 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 67 Redlands | 801 | 105 | 271 | 18.731 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 68 Redlands | 1 | 0 | 5 | 76.280 | 19.070 | 0.000 | 0 | 0.000 | 0.000 |
| 69 Redlands | 389 | 88 | 1 | 0.000 | 72.570 | 0.000 | 0 | 0.000 | 0.000 |
| 70 Redlands | 282 | 3 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 71 Redlands | 95 | 92 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 1.310 |
| 72 Redlands | 75 | 482 | 64 | 6.270 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 73 Redlands | 246 | 141 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 74 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 75 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 76 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 77 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 78 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 79 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 80 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 81 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 82 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 83 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 84 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 85 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 86 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 87 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 88 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 89 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 90 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 91 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 92 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |

Table 1
LAND USE INPUTS
BL2: Redlands Buildout (Revised 6/20/95)

| TRAFFIC ZONE | RESIDENTIAL Low Density Units | RESIDENTIAL Med Density Units | RESIDENTIAL Mbl Homes Units | RETAIL Low KSF | RETAIL Medium KSF | RETAIL High KSF | HOTEL Rooms | OFFICE KSF | SERVICE KSF |
|---|---|---|---|---|---|---|---|---|---|
| 93 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 94 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 95 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 96 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 97 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 98 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 99 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| TOTAL | 23,313 | 11,362 | 1,459 | 7,589.800 | 769.925 | 46.100 | 316 | 9,300.991 | 805.937 |

Table 1
LAND USE INPUTS
BL2: Redlands B

| TRAFFIC ZONE | INDUSTRIAL Light KSF | INDUSTRIAL General KSF | HOSPITAL KSF | SCHOOL Elem/Jr.High Students | SCHOOL High Students | SCHOOL University Students | OTHER Trips | Description |
|---|---|---|---|---|---|---|---|---|
| 1 Redlands | 823.430 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 2 Redlands | 1,748.710 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 3 Redlands | 2,020.710 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 4 Redlands | 2,718.700 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 5 Redlands | 45.302 | 18.820 | 0.000 | 0 | 0 | 0 | 0 | |
| 6 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 7 Redlands | 1,074.020 | 0.000 | 0.000 | 0 | 0 | 0 | 580 | Airport |
| 8 Redlands | 0.000 | 0.000 | 0.000 | 770 | 0 | 0 | 0 | |
| 9 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Misc |
| 10 Redlands | 0.000 | 0.000 | 0.000 | 1,991 | 0 | 0 | 109 | School Office |
| 11 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | School Office |
| 12 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 53 | |
| 13 Redlands | 0.000 | 0.000 | 0.000 | 239 | 72 | 0 | 0 | |
| 14 Redlands | 676.880 | 0.000 | 0.000 | 0 | 0 | 0 | 10 | Misc. |
| 15 Redlands | 823.430 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 16 Redlands | 1,564.140 | 0.000 | 274.620 | 0 | 0 | 0 | 0 | |
| 17 Redlands | 798.740 | 0.000 | 0.000 | 0 | 0 | 0 | 1,300 | 17 acre Theme Park |
| 18 Redlands | 143.710 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Misc. |
| 19 Redlands | 9.583 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Misc. |
| 20 Redlands | 225.630 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 21 Redlands | 505.780 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Misc. |
| 22 Redlands | 12.197 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Misc. |
| 23 Redlands | 0.000 | 0.000 | 0.000 | 317 | 0 | 0 | 0 | Private School |
| 24 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 1,000 | 0 | |
| 25 Redlands | 0.000 | 0.000 | 5.881 | 0 | 0 | 1,000 | 140 | |
| 26 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 27 Redlands | 0.000 | 0.000 | 0.000 | 800 | 0 | 0 | 45 | |
| 28 Redlands | 0.000 | 50.000 | 0.000 | 1,309 | 0 | 0 | 0 | Ag. Facility |
| 29 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Misc. |
| 30 Redlands | 0.000 | 0.000 | 42.035 | 0 | 0 | 0 | 162 | Misc. |
| 31 Redlands | 0.000 | 0.000 | 0.000 | 98 | 2,890 | 0 | 0 | Misc. |
| 32 Redlands | 117.130 | 0.000 | 0.000 | 0 | 0 | 0 | 100 | Church, Misc. |
| 33 Redlands | 43.780 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Misc. |
| 34 Redlands | 47.916 | 0.000 | 0.000 | 0 | 475 | 0 | 100 | Recreation |
| 35 Redlands | 27.007 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 36 Redlands | 87.120 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 37 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Regional P.O. |
| 38 Redlands | 860.710 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 39 Redlands | 286.900 | 0.000 | 93.218 | 61 | 0 | 0 | 0 | Misc. |
| 40 Redlands | 782.830 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 41 Redlands | 724.380 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 42 Redlands | 448.820 | 0.000 | 0.000 | 130 | 232 | 0 | 0 | Misc. |
| 43 Redlands | 476.130 | 0.000 | 0.000 | 312 | 0 | 0 | 131 | Recreation |
| 44 Redlands | 13.270 | 0.000 | 1.090 | 0 | 0 | 0 | 255 | Churches(2), Pub. Off. |
| 45 Redlands | 0.000 | 0.000 | 2.100 | 0 | 0 | 0 | 200 | Churches(2) |
| 46 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 100 | Church |

Table 1
LAND USE INPUTS
BL2: Redlands B

| TRAFFIC ZONE | INDUSTRIAL Light KSF | INDUSTRIAL General KSF | HOSPITAL KSF | SCHOOL Elem/Jr.High Students | SCHOOL High Students | SCHOOL University Students | OTHER Trips | Description |
|---|---|---|---|---|---|---|---|---|
| 47 Redlands | 0.000 | 0.000 | 0.000 | 800 | 0 | 0 | 0 | |
| 48 Redlands | 0.000 | 0.000 | 10.250 | 1,086 | 0 | 0 | 200 | Churches(2) |
| 49 Redlands | 0.000 | 0.000 | 0.000 | 1,300 | 0 | 0 | 0 | School Facility |
| 50 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 100 | Church |
| 51 Redlands | 0.000 | 0.000 | 329.780 | 800 | 0 | 0 | 55 | Misc. Office |
| 52 Redlands | 0.000 | 0.000 | 109.553 | 0 | 0 | 0 | 0 | |
| 53 Redlands | 0.000 | 0.000 | 34.630 | 0 | 0 | 0 | 0 | |
| 54 Redlands | 0.000 | 350.000 | 0.000 | 770 | 0 | 0 | 0 | Co. Landfill |
| 55 Redlands | 0.000 | 0.000 | 0.000 | 1,002 | 0 | 0 | 68 | |
| 56 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 57 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 1,000 | Water Facility, Golf |
| 58 Redlands | 0.000 | 0.000 | 0.000 | 800 | 0 | 0 | 100 | Church |
| 59 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Misc. |
| 60 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 61 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 62 Redlands | 756.770 | 62.726 | 0.000 | 0 | 0 | 0 | 0 | Misc. |
| 63 Redlands | 28.750 | 300.000 | 0.000 | 0 | 0 | 0 | 0 | Misc. |
| 64 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 65 Redlands | 0.000 | 0.000 | 0.000 | 800 | 0 | 0 | 0 | |
| 66 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 67 Redlands | 23.522 | 19.166 | 14.266 | 770 | 0 | 0 | 0 | |
| 68 Redlands | 3,200.310 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Split of 1 |
| 69 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Split of 24 |
| 70 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Split of 24 |
| 71 Redlands | 0.000 | 0.000 | 0.000 | 800 | 0 | 0 | 0 | Split of 25 |
| 72 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Split of 25 |
| 73 Redlands | 135.080 | 0.000 | 0.000 | 913 | 1774 | 0 | 0 | Split of 62 |
| 74 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 75 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 76 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 77 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 78 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 79 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 80 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 81 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 82 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 83 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 84 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 85 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 86 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 87 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 88 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 89 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 90 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 91 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 92 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |

Table 1
LAND USE INPUTS
BL2: Redlands B

| TRAFFIC ZONE | INDUSTRIAL Light KSF | INDUSTRIAL General KSF | HOSPITAL KSF | SCHOOL Elem/Jr.High Students | SCHOOL High Students | SCHOOL University Students | OTHER Trips | Description |
|---|---|---|---|---|---|---|---|---|
| 93 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 94 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 95 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 96 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 97 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 98 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 99 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| TOTAL | 21,251.388 | 800.713 | 917.424 | 15,868 | 5,443 | 2,000 | 4,809 | |

Table 2
TRIP GENERATION RATES

| LAND USE | PRODUCTIONS HBW | HBS | HBO | NHB | TOTAL |
|---|---|---|---|---|---|
| Residential: Low | 2.70 | 3.30 | 2.30 | 0.30 | 8.60 |
| Residential: Med | 2.00 | 2.40 | 1.80 | 0.20 | 6.40 |
| Residential: MH | 1.20 | 1.50 | 1.20 | 0.20 | 4.10 |
| Retail: Low | 0.00 | 0.00 | 0.00 | 9.40 | 9.40 |
| Retail: Medium | 0.00 | 0.00 | 0.00 | 14.10 | 14.10 |
| Retail: High | 0.00 | 0.00 | 0.00 | 40.20 | 40.20 |
| Hotel | 0.00 | 0.00 | 0.00 | 2.40 | 2.40 |
| Office | 0.00 | 0.00 | 0.00 | 1.35 | 1.35 |
| Service | 0.00 | 0.00 | 0.00 | 1.20 | 1.20 |
| Industrial: Lt | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 |
| Industrial: Gen | 0.00 | 0.00 | 0.00 | 0.35 | 0.35 |
| Hospital | 0.00 | 0.00 | 0.00 | 0.60 | 0.60 |
| School: Elem/JH | 0.00 | 0.00 | 0.00 | 0.14 | 0.14 |
| School: High | 0.00 | 0.00 | 0.00 | 0.21 | 0.21 |
| School: Univrsty | 0.00 | 0.00 | 0.00 | 0.22 | 0.22 |
| Other | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

Table 2
TRIP GENERATION

| | ATTRACTIONS | | | | | TOTAL |
|---|---|---|---|---|---|---|
| LAND USE | HBW | HBS | HBO | NHB | TOTAL | P+A |
| Residential: Low | 0.00 | 0.00 | 1.10 | 0.30 | 1.40 | 10.00 |
| Residential: Med | 0.00 | 0.00 | 0.80 | 0.20 | 1.00 | 7.40 |
| Residential: MH | 0.00 | 0.00 | 0.50 | 0.20 | 0.70 | 4.80 |
| Retail: Low | 1.70 | 19.00 | 0.50 | 9.40 | 30.60 | 40.00 |
| Retail: Medium | 3.40 | 42.40 | 1.00 | 14.10 | 60.90 | 75.00 |
| Retail: High | 3.40 | 40.20 | 1.00 | 40.20 | 84.80 | 125.00 |
| Hotel | 1.10 | 0.00 | 2.80 | 2.40 | 6.30 | 8.70 |
| Office | 6.80 | 0.00 | 2.00 | 1.35 | 10.15 | 11.50 |
| Service | 5.10 | 1.00 | 1.50 | 1.20 | 8.80 | 10.00 |
| Industrial: Lt | 3.90 | 0.00 | 1.10 | 1.00 | 6.00 | 7.00 |
| Industrial: Gen | 3.10 | 0.00 | 0.00 | 0.35 | 3.45 | 3.80 |
| Hospital | 10.20 | 0.00 | 5.30 | 0.60 | 16.10 | 16.70 |
| School: Elem/JH | 0.14 | 0.00 | 0.58 | 0.14 | 0.86 | 1.00 |
| School: High | 0.14 | 0.00 | 0.84 | 0.21 | 1.19 | 1.40 |
| School: Univrsty | 0.26 | 0.00 | 0.90 | 0.22 | 1.38 | 1.60 |
| Other | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 |

Table 3-P
REDLANDS PRODUCTIONS
BL2: Redlands Buildout (Revised 6/20/95)

| ID | ZONE RECORD | HBW | HBS | HBO | NHB |
|---|---|---|---|---|---|
| GP | 1 1 | 0 | 0 | 0 | 3008 |
| GP | 2 1 | 0 | 0 | 0 | 3917 |
| GP | 3 1 | 0 | 0 | 0 | 4713 |
| GP | 4 1 | 0 | 0 | 0 | 5341 |
| GP | 5 1 | 1315 | 1613 | 1153 | 210 |
| GP | 6 1 | 3307 | 4040 | 2822 | 367 |
| GP | 7 1 | 481 | 587 | 411 | 1302 |
| GP | 8 1 | 1175 | 1437 | 1002 | 776 |
| GP | 9 1 | 2724 | 3333 | 2382 | 323 |
| GP | 10 1 | 1305 | 1575 | 1156 | 1032 |
| GP | 11 1 | 1714 | 2086 | 1479 | 200 |
| GP | 12 1 | 366 | 447 | 312 | 6351 |
| GP | 13 1 | 0 | 0 | 0 | 17439 |
| GP | 14 1 | 0 | 0 | 0 | 3575 |
| GP | 15 1 | 0 | 0 | 0 | 3000 |
| GP | 16 1 | 0 | 0 | 0 | 4826 |
| GP | 17 1 | 0 | 0 | 0 | 5210 |
| GP | 18 1 | 0 | 0 | 0 | 1821 |
| GP | 19 1 | 0 | 0 | 0 | 2131 |
| GP | 20 1 | 0 | 0 | 0 | 1013 |
| GP | 21 1 | 612 | 737 | 544 | 2938 |
| GP | 22 1 | 1733 | 2116 | 1483 | 705 |
| GP | 23 1 | 2547 | 3082 | 2237 | 764 |
| GP | 24 1 | 828 | 994 | 745 | 303 |
| GP | 25 1 | 1019 | 1225 | 911 | 335 |
| GP | 26 1 | 3341 | 4082 | 2880 | 1081 |
| GP | 27 1 | 2670 | 3268 | 2341 | 426 |
| GP | 28 1 | 1711 | 2090 | 1462 | 1236 |
| GP | 29 1 | 1459 | 1784 | 1246 | 599 |
| GP | 30 1 | 3133 | 3799 | 2735 | 980 |
| GP | 31 1 | 479 | 583 | 413 | 700 |
| GP | 32 1 | 387 | 466 | 343 | 6770 |
| GP | 33 1 | 304 | 365 | 274 | 1462 |
| GP | 34 1 | 0 | 0 | 0 | 1152 |
| GP | 35 1 | 0 | 0 | 0 | 5044 |
| GP | 36 1 | 0 | 0 | 0 | 2429 |
| GP | 37 1 | 0 | 0 | 0 | 4090 |
| GP | 38 1 | 216 | 259 | 194 | 1932 |
| GP | 39 1 | 1336 | 1604 | 1200 | 1796 |
| GP | 40 1 | 0 | 0 | 0 | 3646 |
| GP | 41 1 | 16 | 19 | 14 | 2769 |
| GP | 42 1 | 2949 | 3539 | 2653 | 1899 |
| GP | 43 1 | 2467 | 2963 | 2215 | 2029 |
| GP | 44 1 | 1482 | 1795 | 1296 | 2138 |
| GP | 45 1 | 2025 | 2439 | 1802 | 506 |
| GP | 46 1 | 1040 | 1262 | 905 | 2238 |

Table 3-P
REDLANDS PRODUCTIONS
BL2: Redlands Buildout (Revised 6/20/95)

| ID | ZONE RECORD | HBW | HBS | HBO | NHB |
|---|---|---|---|---|---|
| GP | 47 1 | 1016 | 1242 | 866 | 225 |
| GP | 48 1 | 1751 | 2130 | 1514 | 427 |
| GP | 49 1 | 2181 | 2661 | 1869 | 434 |
| GP | 50 1 | 1183 | 1444 | 1010 | 278 |
| GP | 51 1 | 3998 | 4853 | 3477 | 1187 |
| GP | 52 1 | 1131 | 1382 | 964 | 191 |
| GP | 53 1 | 3056 | 3735 | 2604 | 360 |
| GP | 54 1 | 792 | 968 | 676 | 319 |
| GP | 55 1 | 3388 | 4140 | 2887 | 588 |
| GP | 56 1 | 2054 | 2510 | 1751 | 229 |
| GP | 57 1 | 1276 | 1559 | 1087 | 147 |
| GP | 58 1 | 3060 | 3737 | 2613 | 626 |
| GP | 59 1 | 1260 | 1540 | 1074 | 147 |
| GP | 60 1 | 2223 | 2717 | 1894 | 247 |
| GP | 61 1 | 352 | 431 | 300 | 39 |
| GP | 62 1 | 1683 | 2056 | 1437 | 2601 |
| GP | 63 1 | 3004 | 3654 | 2597 | 1260 |
| GP | 64 1 | 149 | 182 | 126 | 17 |
| GP | 65 1 | 1245 | 1526 | 1095 | 650 |
| GP | 66 1 | 1148 | 1403 | 978 | 128 |
| GP | 67 1 | 2698 | 3302 | 2357 | 638 |
| GP | 68 1 | 9 | 11 | 8 | 4188 |
| GP | 69 1 | 1228 | 1496 | 1054 | 1158 |
| GP | 70 1 | 767 | 938 | 654 | 85 |
| GP | 71 1 | 441 | 534 | 384 | 160 |
| GP | 72 1 | 1243 | 1500 | 1117 | 191 |
| GP | 73 1 | 946 | 1150 | 820 | 737 |
| GP | 74 1 | 0 | 0 | 0 | 0 |
| GP | 75 1 | 0 | 0 | 0 | 0 |
| GP | 76 1 | 0 | 0 | 0 | 0 |
| GP | 77 1 | 0 | 0 | 0 | 0 |
| GP | 78 1 | 0 | 0 | 0 | 0 |
| GP | 79 1 | 0 | 0 | 0 | 0 |
| GP | 80 1 | 0 | 0 | 0 | 0 |
| GP | 81 1 | 0 | 0 | 0 | 0 |
| GP | 82 1 | 0 | 0 | 0 | 0 |
| GP | 83 1 | 0 | 0 | 0 | 0 |
| GP | 84 1 | 0 | 0 | 0 | 0 |
| GP | 85 1 | 0 | 0 | 0 | 0 |
| GP | 86 1 | 0 | 0 | 0 | 0 |
| GP | 87 1 | 0 | 0 | 0 | 0 |
| GP | 88 1 | 0 | 0 | 0 | 0 |
| GP | 89 1 | 0 | 0 | 0 | 0 |
| GP | 90 1 | 0 | 0 | 0 | 0 |
| GP | 91 1 | 0 | 0 | 0 | 0 |
| GP | 92 1 | 0 | 0 | 0 | 0 |

Table 3-P
REDLANDS PRODUCTIONS
BL2: Redlands Buildout (Revised 6/20/95)

| ID | ZONE | RECORD | HBW | HBS | HBO | NHB |
|---|---|---|---|---|---|---|
| GP | 93 | 1 | 0 | 0 | 0 | 0 |
| GP | 94 | 1 | 0 | 0 | 0 | 0 |
| GP | 95 | 1 | 0 | 0 | 0 | 0 |
| GP | 96 | 1 | 0 | 0 | 0 | 0 |
| GP | 97 | 1 | 0 | 0 | 0 | 0 |
| GP | 98 | 1 | 0 | 0 | 0 | 0 |
| GP | 99 | 1 | 0 | 0 | 0 | 0 |
| TOTAL REDLANDS PRODUCTIONS | | | 87,420 | 106,390 | 75,822 | 133,780 |

Table 3-A
REDLANDS ATTRACTIONS
BL2: Redlands Buildout (Revised 6/20/95)

| ID | ZONE | RECORD | HBW | HBS | HBO | NHB | TOTAL |
|---|---|---|---|---|---|---|---|
| GA | 1 | 1 | 9005 | 2168 | 2610 | 3008 | 19,798 |
| GA | 2 | 1 | 12570 | 2153 | 3615 | 3917 | 26,172 |
| GA | 3 | 1 | 11808 | 4085 | 3378 | 4713 | 28,696 |
| GA | 4 | 1 | 14322 | 4022 | 4084 | 5341 | 33,110 |
| GA | 5 | 1 | 235 | 0 | 587 | 210 | 5,322 |
| GA | 6 | 1 | 0 | 0 | 1347 | 367 | 12,250 |
| GA | 7 | 1 | 5068 | 0 | 2216 | 1302 | 11,367 |
| GA | 8 | 1 | 205 | 1087 | 954 | 776 | 7,413 |
| GA | 9 | 1 | 23 | 5 | 1118 | 323 | 10,231 |
| GA | 10 | 1 | 687 | 1696 | 1909 | 1032 | 10,392 |
| GA | 11 | 1 | 68 | 0 | 715 | 200 | 6,462 |
| GA | 12 | 1 | 3890 | 11611 | 1346 | 6351 | 30,672 |
| GA | 13 | 1 | 3189 | 35150 | 1124 | 17439 | 74,340 |
| GA | 14 | 1 | 7602 | 4012 | 2214 | 3575 | 20,978 |
| GA | 15 | 1 | 9003 | 2153 | 2609 | 3000 | 19,767 |
| GA | 16 | 1 | 17506 | 3053 | 5707 | 4826 | 35,917 |
| GA | 17 | 1 | 3913 | 8917 | 2413 | 5210 | 25,664 |
| GA | 18 | 1 | 2710 | 2644 | 790 | 1821 | 9,787 |
| GA | 19 | 1 | 3337 | 3199 | 981 | 2131 | 11,779 |
| GA | 20 | 1 | 1071 | 1599 | 305 | 1013 | 5,000 |
| GA | 21 | 1 | 3531 | 4270 | 1261 | 2938 | 16,830 |
| GA | 22 | 1 | 633 | 865 | 891 | 705 | 9,131 |
| GA | 23 | 1 | 180 | 1111 | 1251 | 764 | 11,934 |
| GA | 24 | 1 | 260 | 0 | 1231 | 303 | 4,664 |
| GA | 25 | 1 | 328 | 15 | 1482 | 335 | 5,649 |
| GA | 26 | 1 | 170 | 2120 | 1411 | 1081 | 16,166 |
| GA | 27 | 1 | 112 | 0 | 1598 | 426 | 10,841 |
| GA | 28 | 1 | 542 | 2544 | 1516 | 1236 | 12,337 |
| GA | 29 | 1 | 465 | 736 | 731 | 599 | 7,619 |
| GA | 30 | 1 | 777 | 1188 | 1753 | 980 | 15,345 |
| GA | 31 | 1 | 536 | 23 | 2713 | 700 | 6,147 |
| GA | 32 | 1 | 5653 | 11891 | 1912 | 6770 | 34,191 |
| GA | 33 | 1 | 2164 | 947 | 1375 | 1462 | 8,352 |
| GA | 34 | 1 | 581 | 1710 | 812 | 1152 | 5,407 |
| GA | 35 | 1 | 1474 | 11942 | 432 | 5044 | 23,936 |
| GA | 36 | 1 | 991 | 5178 | 287 | 2429 | 11,314 |
| GA | 37 | 1 | 1717 | 7847 | 505 | 4090 | 18,251 |
| GA | 38 | 1 | 4484 | 1837 | 1365 | 1932 | 12,220 |
| GA | 39 | 1 | 3508 | 2255 | 1800 | 1796 | 15,296 |
| GA | 40 | 1 | 4729 | 5322 | 1354 | 3646 | 18,697 |
| GA | 41 | 1 | 4005 | 3797 | 1150 | 2769 | 14,540 |
| GA | 42 | 1 | 3067 | 1760 | 2316 | 1899 | 20,084 |
| GA | 43 | 1 | 3493 | 1996 | 2292 | 2029 | 19,484 |
| GA | 44 | 1 | 1644 | 3351 | 1339 | 2138 | 15,182 |
| GA | 45 | 1 | 690 | 347 | 1221 | 506 | 9,536 |
| GA | 46 | 1 | 572 | 6360 | 689 | 2238 | 15,305 |

Table 3-A
REDLANDS ATTRACTIONS
BL2: Redlands Buildout (Revised 6/20/95)

| ID | ZONE RECORD | HBW | HBS | HBO | NHB | TOTAL |
|---|---|---|---|---|---|---|
| GA | 47 1 | 112 | 0 | 878 | 225 | 4,564 |
| GA | 48 1 | 657 | 0 | 1712 | 427 | 8,619 |
| GA | 49 1 | 233 | 10 | 1656 | 434 | 9,478 |
| GA | 50 1 | 27 | 298 | 589 | 278 | 5,107 |
| GA | 51 1 | 4352 | 582 | 4142 | 1187 | 23,778 |
| GA | 52 1 | 1117 | 0 | 1041 | 191 | 6,019 |
| GA | 53 1 | 353 | 0 | 1428 | 360 | 11,897 |
| GA | 54 1 | 1193 | 0 | 769 | 319 | 5,036 |
| GA | 55 1 | 500 | 0 | 2135 | 588 | 14,225 |
| GA | 56 1 | 0 | 0 | 837 | 229 | 7,608 |
| GA | 57 1 | 11 | 7 | 1523 | 147 | 5,755 |
| GA | 58 1 | 985 | 8 | 2067 | 626 | 13,722 |
| GA | 59 1 | 31 | 6 | 522 | 147 | 4,727 |
| GA | 60 1 | 0 | 0 | 906 | 247 | 8,234 |
| GA | 61 1 | 0 | 0 | 144 | 39 | 1,305 |
| GA | 62 1 | 3691 | 3396 | 1678 | 2601 | 19,143 |
| GA | 63 1 | 1253 | 1637 | 1312 | 1260 | 15,978 |
| GA | 64 1 | 0 | 0 | 61 | 17 | 550 |
| GA | 65 1 | 182 | 786 | 993 | 650 | 7,129 |
| GA | 66 1 | 0 | 2 | 468 | 128 | 4,256 |
| GA | 67 1 | 436 | 356 | 1658 | 638 | 12,083 |
| GA | 68 1 | 12676 | 2258 | 3581 | 4188 | 26,918 |
| GA | 69 1 | 247 | 3077 | 571 | 1158 | 9,989 |
| GA | 70 1 | 0 | 0 | 313 | 85 | 2,842 |
| GA | 71 1 | 119 | 1 | 644 | 160 | 2,444 |
| GA | 72 1 | 11 | 119 | 503 | 191 | 4,875 |
| GA | 73 1 | 903 | 0 | 2552 | 737 | 7,846 |
| GA | 74 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 75 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 76 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 77 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 78 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 79 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 80 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 81 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 82 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 83 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 84 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 85 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 86 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 87 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 88 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 89 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 90 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 91 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 92 1 | 0 | 0 | 0 | 0 | 0 |

Table 3-A
REDLANDS ATTRACTIONS
BL2: Redlands Buildout (Revised 6/20/95)

| ID | ZONE | RECORD | HBW | HBS | HBO | NHB | TOTAL |
|---|---|---|---|---|---|---|---|
| GA | 93 | 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 94 | 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 95 | 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 96 | 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 97 | 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 98 | 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 99 | 1 | 0 | 0 | 0 | 0 | 0 |
| TOTAL REDLANDS ATTRACTIONS | | | 181,606 | 179,510 | 109,393 | 133,780 | 1,007,701 |

Table 4-P
BUFFER AREA PRODUCTIONS
From SCAG/CTP 2010 Vehicle Trip Tables
BL2: Redlands Buildout (Revised 6/20/95)

| ID | ZONE RECORD | HBW | HBS | HBO | NHB |
|---|---|---|---|---|---|
| Derivation from SCAG | | 100% | 19% | 48% | 33% |
| Vehicle Trips | | SCAG H-W | of OTHER | of OTHER | OTHER + O-W |
| GP | 100 1 | 4960 | 2584 | 6528 | 4878 |
| GP | 101 1 | 16663 | 10593 | 26762 | 21403 |
| GP | 102 1 | 3707 | 3156 | 7973 | 7699 |
| GP | 103 1 | 4731 | 2823 | 7131 | 5858 |
| GP | 104 1 | 281 | 287 | 726 | 536 |
| GP | 105 1 | 4918 | 2665 | 6732 | 5136 |
| GP | 106 1 | 4305 | 2029 | 5126 | 3524 |
| GP | 107 1 | 3573 | 2916 | 7366 | 7203 |
| GP | 108 1 | 1228 | 761 | 1922 | 1643 |
| GP | 109 1 | 1845 | 1895 | 4788 | 5468 |
| GP | 110 1 | 2623 | 1926 | 4867 | 5562 |
| GP | 111 1 | 3638 | 2172 | 5486 | 4634 |
| GP | 112 1 | 2161 | 1983 | 5011 | 4986 |
| GP | 113 1 | 3520 | 2111 | 5333 | 4547 |
| GP | 114 1 | 3492 | 2144 | 5415 | 5067 |
| GP | 115 1 | 2450 | 1406 | 3551 | 3233 |
| GP | 116 1 | 2218 | 2747 | 6939 | 7768 |
| GP | 117 1 | 4765 | 3351 | 8466 | 7588 |
| GP | 118 1 | 1785 | 1297 | 3276 | 4489 |
| GP | 119 1 | 3498 | 2134 | 5390 | 4948 |
| GP | 120 1 | 2589 | 1480 | 3739 | 3289 |
| GP | 121 1 | 20989 | 10023 | 25322 | 18152 |
| GP | 122 1 | 442 | 2141 | 5409 | 9943 |
| GP | 123 1 | 1124 | 1044 | 2637 | 5000 |
| GP | 124 1 | 3467 | 2911 | 7354 | 8131 |
| GP | 125 1 | 455 | 1569 | 3963 | 6563 |
| GP | 126 1 | 100 | 1957 | 4944 | 11499 |
| GP | 127 1 | 0 | 646 | 1632 | 2648 |
| GP | 128 1 | 25 | 1611 | 4069 | 6738 |
| GP | 129 1 | 153 | 604 | 1526 | 2336 |
| GP | 130 1 | 509 | 614 | 1551 | 2372 |
| GP | 131 1 | 876 | 1436 | 3628 | 4916 |
| GP | 132 1 | 1447 | 2307 | 5827 | 8364 |
| GP | 133 1 | 131 | 737 | 1861 | 4064 |
| GP | 134 1 | 3588 | 2590 | 6543 | 6796 |
| GP | 135 1 | 2432 | 3058 | 7725 | 9024 |
| GP | 136 1 | 12820 | 7894 | 19942 | 20841 |
| GP | 137 1 | 3102 | 1637 | 4136 | 3968 |
| GP | 138 1 | 962 | 582 | 1470 | 1173 |
| GP | 139 1 | 75 | 217 | 549 | 994 |
| GP | 140 1 | 19535 | 10737 | 27125 | 20473 |
| GP | 141 1 | 2770 | 1691 | 4272 | 3851 |
| GP | 142 1 | 10878 | 8876 | 22423 | 24299 |
| GP | 143 1 | 2438 | 1680 | 4245 | 3087 |

Table 4-P
BUFFER AREA PRODUCTIONS
From SCAG/CTP 2010 Vehicle Trip Tables
BL2: Redlands Buildout (Revised 6/20/95)

| ID | ZONE RECORD | HBW | HBS | HBO | NHB |
|---|---|---|---|---|---|
| Derivation from SCAG | | 100% | 19% | 48% | 33% |
| Vehicle Trips | | SCAG H-W | of OTHER | of OTHER | OTHER + O-W |
| GP | 144 1 | 2424 | 1271 | 3212 | 2221 |
| GP | 145 1 | 3041 | 1954 | 4936 | 4594 |
| GP | 146 1 | 1660 | 1334 | 3371 | 4339 |
| GP | 147 1 | 2180 | 1179 | 2978 | 2165 |
| GP | 148 1 | 4 | 123 | 310 | 512 |
| GP | 149 1 | 694 | 393 | 994 | 822 |
| GP | 150 1 | 1009 | 527 | 1331 | 993 |
| GP | 151 1 | 781 | 440 | 1112 | 997 |
| GP | 152 1 | 241 | 205 | 519 | 721 |
| GP | 153 1 | 3038 | 2121 | 5358 | 5345 |
| GP | 154 1 | 428 | 239 | 605 | 504 |
| GP | 155 1 | 3867 | 2266 | 5725 | 4361 |
| GP | 156 1 | 25046 | 16456 | 41574 | 39121 |
| GP | 157 1 | 11420 | 6109 | 15432 | 10735 |
| GP | 158 1 | 0 | 0 | 0 | 0 |
| GP | 159 1 | 0 | 0 | 0 | 0 |
| GP | 160 1 | 0 | 0 | 0 | 0 |
| GP | 161 1 | 0 | 0 | 0 | 0 |
| GP | 162 1 | 0 | 0 | 0 | 0 |
| GP | 163 1 | 0 | 0 | 0 | 0 |
| GP | 164 1 | 0 | 0 | 0 | 0 |
| GP | 165 1 | 0 | 0 | 0 | 0 |
| GP | 166 1 | 0 | 0 | 0 | 0 |
| GP | 167 1 | 0 | 0 | 0 | 0 |
| GP | 168 1 | 0 | 0 | 0 | 0 |
| GP | 169 1 | 0 | 0 | 0 | 0 |
| GP | 170 1 | .0 | 0 | 0 | 0 |
| GP | 171 1 | 0 | 0 | 0 | 0 |
| GP | 172 1 | 0 | 0 | 0 | 0 |
| GP | 173 1 | 0 | 0 | 0 | 0 |
| GP | 174 1 | 0 | 0 | 0 | 0 |
| GP | 175 1 | 0 | 0 | 0 | 0 |
| GP | 176 1 | 0 | 0 | 0 | 0 |
| GP | 177 1 | 0 | 0 | 0 | 0 |
| GP | 178 1 | 0 | 0 | 0 | 0 |
| GP | 179 1 | 0 | 0 | 0 | 0 |
| TOTAL BUFFER PRODUCTIONS | | 223,101 | 153,637 | 388,136 | 382,122 |

Table 4-A
BUFFER AREA ATTRACTIONS
From SCAG/CTP 2010 Vehicle Trip Tables
BL2: Redlands Buildout (Revised 6/20/95)

| ID | ZONE RECORD | HBW | HBS | HBO | NHB | TOTAL |
|---|---|---|---|---|---|---|
| Derivation from SCAG | | 100% | 19% | 48% | 33% | |
| Vehicle Trips | | SCAG H-W | of OTHER | of OTHER | OTHER + O-W | |
| GA | 100 1 | 706 | 1437 | 3630 | 2881 | 27,603 |
| GA | 101 1 | 4150 | 7795 | 19693 | 15674 | 122,733 |
| GA | 102 1 | 2880 | 3648 | 9216 | 7785 | 46,063 |
| GA | 103 1 | 1312 | 2138 | 5400 | 4347 | 33,740 |
| GA | 104 1 | 76 | 154 | 389 | 314 | 2,763 |
| GA | 105 1 | 929 | 1558 | 3937 | 3168 | 29,043 |
| GA | 106 1 | 0 | 870 | 2197 | 1510 | 19,561 |
| GA | 107 1 | 2919 | 3164 | 7992 | 6980 | 42,111 |
| GA | 108 1 | 397 | 616 | 1556 | 1283 | 9,405 |
| GA | 109 1 | 3334 | 2550 | 6442 | 6180 | 32,503 |
| GA | 110 1 | 4091 | 2071 | 5231 | 5680 | 32,051 |
| GA | 111 1 | 1669 | 1607 | 4059 | 3615 | 26,879 |
| GA | 112 1 | 2547 | 2239 | 5657 | 5227 | 29,811 |
| GA | 113 1 | 1633 | 1530 | 3865 | 3490 | 26,030 |
| GA | 114 1 | 2938 | 1692 | 4275 | 4459 | 29,483 |
| GA | 115 1 | 1630 | 985 | 2489 | 2538 | 18,282 |
| GA | 116 1 | 3583 | 4268 | 10781 | 9293 | 47,597 |
| GA | 117 1 | 2598 | 3172 | 8013 | 6853 | 44,805 |
| GA | 118 1 | 4796 | 1529 | 3862 | 5062 | 26,096 |
| GA | 119 1 | 2310 | 1842 | 4655 | 4369 | 29,146 |
| GA | 120 1 | 1499 | 1081 | 2730 | 2630 | 19,037 |
| GA | 121 1 | 1663 | 4657 | 11766 | 8927 | 101,501 |
| GA | 122 1 | 10035 | 4939 | 12477 | 14092 | 59,477 |
| GA | 123 1 | 7253 | 1138 | 2876 | 5922 | 26,993 |
| GA | 124 1 | 5064 | 3566 | 9008 | 8804 | 48,305 |
| GA | 125 1 | 5803 | 3553 | 8977 | 9273 | 40,156 |
| GA | 126 1 | 16028 | 5165 | 13049 | 17291 | 70,035 |
| GA | 127 1 | 2230 | 1845 | 4662 | 4371 | 18,034 |
| GA | 128 1 | 5076 | 4228 | 10680 | 9969 | 42,395 |
| GA | 129 1 | 1632 | 1406 | 3552 | 3290 | 14,500 |
| GA | 130 1 | 2485 | 990 | 2500 | 3047 | 14,067 |
| GA | 131 1 | 3053 | 2729 | 6895 | 6327 | 29,862 |
| GA | 132 1 | 6505 | 4552 | 11501 | 11293 | 51,796 |
| GA | 133 1 | 5273 | 1783 | 4505 | 5835 | 24,189 |
| GA | 134 1 | 3728 | 2871 | 7253 | 6912 | 40,281 |
| GA | 135 1 | 4749 | 4699 | 11870 | 10667 | 54,223 |
| GA | 136 1 | 15845 | 6045 | 15271 | 18692 | 117,348 |
| GA | 137 1 | 2513 | 956 | 2415 | 2977 | 21,704 |
| GA | 138 1 | 192 | 393 | 992 | 763 | 6,527 |
| GA | 139 1 | 1147 | 511 | 1290 | 1461 | 6,243 |
| GA | 140 1 | 2486 | 6599 | 16670 | 12689 | 116,314 |
| GA | 141 1 | 1520 | 1458 | 3684 | 3261 | 22,509 |
| GA | 142 1 | 16127 | 9078 | 22935 | 23838 | 138,453 |
| GA | 143 1 | 301 | 939 | 2373 | 1778 | 16,841 |

Table 4-A
BUFFER AREA ATTRACTIONS
From SCAG/CTP 2010 Vehicle Trip Tables
BL2: Redlands Buildout (Revised 6/20/95)

| ID | ZONE RECORD | HBW | HBS | HBO | NHB | TOTAL |
|---|---|---|---|---|---|---|
| Derivation from SCAG Vehicle Trips | | 100% SCAG H-W | 19% of OTHER | 48% of OTHER | 33% OTHER + O-W | |
| GA | 144 1 | 22 | 581 | 1468 | 1026 | 12,226 |
| GA | 145 1 | 2071 | 1639 | 4141 | 3902 | 26,279 |
| GA | 146 1 | 3596 | 1686 | 4260 | 4725 | 24,971 |
| GA | 147 1 | 193 | 622 | 1572 | 1177 | 12,066 |
| GA | 148 1 | 421 | 329 | 831 | 778 | 3,307 |
| GA | 149 1 | 379 | 224 | 565 | 574 | 4,645 |
| GA | 150 1 | 226 | 274 | 692 | 586 | 5,638 |
| GA | 151 1 | 668 | 302 | 764 | 844 | 5,909 |
| GA | 152 1 | 899 | 287 | 726 | 951 | 4,550 |
| GA | 153 1 | 3181 | 2134 | 5392 | 5301 | 31,871 |
| GA | 154 1 | 258 | 132 | 334 | 348 | 2,848 |
| GA | 155 1 | 467 | 1375 | 3474 | 2632 | 24,167 |
| GA | 156 1 | 16188 | 16142 | 40780 | 35913 | 231,220 |
| GA | 157 1 | 226 | 3007 | 7596 | 5331 | 59,855 |
| GA | 158 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 159 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 160 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 161 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 162 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 163 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 164 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 165 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 166 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 167 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 168 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 169 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 170 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 171 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 172 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 173 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 174 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 175 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 176 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 177 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 178 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 179 1 | 0 | 0 | 0 | 0 | 0 |
| TOTAL BUFFER ATTRACTIONS | | 195,500 | 148,780 | 375,866 | 358,905 | 2,226,047 |

Table 5
UNBALANCED INTERNAL-EXTERNAL TRIPS
BL2: Redlands Buildout (Revised 6/20/95)

| GATEWAY | GATEWAY PRODUCTIONS (X-I TRIPS) HBW | HBS | HBO | NHB | TOTAL |
|---|---|---|---|---|---|
| 180 SR 330 | 2506 | 212 | 537 | 936 | 4,191 |
| 181 SR 38 | 1199 | 162 | 410 | 448 | 2,219 |
| 182 I-10 East | 23231 | 9537 | 24094 | 21507 | 78,369 |
| 183 SR 60 West | 6901 | 2638 | 6663 | 5687 | 21,889 |
| 184 Barton Road | 2511 | 2286 | 5774 | 4705 | 15,276 |
| 185 I-215 South | 27408 | 8796 | 22222 | 25135 | 83,561 |
| 186 I-10 West | 18219 | 10750 | 27158 | 26388 | 82,515 |
| 187 Inland Ctr | 1272 | 1187 | 2998 | 2752 | 8,208 |
| 188 Rialto Ave | 853 | 722 | 1824 | 1727 | 5,126 |
| 189 SR 66 | 1477 | 1303 | 3293 | 3240 | 9,313 |
| 190 Baseline Ave | 1982 | 1551 | 3918 | 3275 | 10,726 |
| 191 SR 30 West | 7820 | 4540 | 11471 | 9364 | 33,195 |
| 192 I-215 North | 5763 | 3674 | 9283 | 8027 | 26,747 |
| 193 SR 206 | 1448 | 1201 | 3035 | 2272 | 7,956 |
| 194 SR 18 | 2178 | 189 | 479 | 747 | 3,593 |
| TOTAL GATEWAYS | 104,768 | 48,750 | 123,157 | 116,209 | 392,884 |

| GATEWAY | GATEWAY ATTRACTIONS (I-X TRIPS) HBW | HBS | HBO | NHB | TOTAL | TOTAL TRIPS |
|---|---|---|---|---|---|---|
| 180 SR 330 | 353 | 192 | 484 | 591 | 1,620 | 5,811 |
| 181 SR 38 | 260 | 126 | 319 | 378 | 1,083 | 3,302 |
| 182 I-10 East | 8638 | 6199 | 15660 | 15439 | 45,936 | 124,305 |
| 183 SR 60 West | 1819 | 2216 | 5597 | 4741 | 14,373 | 36,262 |
| 184 Barton Road | 1033 | 1321 | 3337 | 3137 | 8,829 | 24,105 |
| 185 I-215 South | 34158 | 12020 | 30365 | 38856 | 115,399 | 198,960 |
| 186 I-10 West | 42866 | 10343 | 26130 | 38585 | 117,924 | 200,439 |
| 187 Inland Ctr | 803 | 997 | 2519 | 2398 | 6,716 | 14,924 |
| 188 Rialto Ave | 681 | 528 | 1333 | 1493 | 4,035 | 9,161 |
| 189 SR 66 | 1481 | 996 | 2516 | 2978 | 7,970 | 17,283 |
| 190 Baseline Ave | 1136 | 950 | 2400 | 2477 | 6,963 | 17,689 |
| 191 SR 30 West | 3593 | 2139 | 5405 | 6449 | 17,586 | 50,781 |
| 192 I-215 North | 4041 | 2488 | 6285 | 7369 | 20,182 | 46,929 |
| 193 SR 206 | 418 | 746 | 1884 | 1542 | 4,590 | 12,546 |
| 194 SR 18 | 580 | 139 | 351 | 703 | 1,773 | 5,366 |
| TOTAL GATEWAYS | 101,860 | 41,399 | 104,586 | 127,135 | 374,979 | 767,863 |

Table 6
INTERNAL AND EXTERNAL TRIP BALANCE
BL2: Redlands Buildout (Revised 6/20/95)

| | HBW | HBS | HBO | NHB | TOTAL |
|---|---|---|---|---|---|
| REDLANDS TRIPS | | | | | |
| Productions | 87,420 | 106,390 | 75,822 | 133,780 | 403,412 |
| Attractions | 181,606 | 179,510 | 109,393 | 133,780 | 604,289 |
| (P) - (A) | (94,186) | (73,120) | (33,571) | 0 | (200,877) |
| BUFFER TRIPS | | | | | |
| Productions | 223,101 | 153,637 | 388,136 | 382,122 | 1,146,996 |
| Attractions | 195,500 | 148,780 | 375,866 | 358,905 | 1,079,051 |
| (P) - (A) | 27,601 | 4,857 | 12,270 | 23,217 | 67,945 |
| GATEWAY TRIPS | | | | | |
| Productions | 104,768 | 48,750 | 123,157 | 116,209 | 392,884 |
| Attractions | 101,860 | 41,399 | 104,586 | 127,135 | 374,979 |
| (P) - (A) | 2,908 | 7,351 | 18,572 | (10,926) | 17,905 |
| TOTAL TRIPS | | | | | |
| Productions | 415,289 | 308,777 | 587,115 | 632,111 | 1,943,292 |
| Attractions | 478,966 | 369,689 | 589,845 | 619,819 | 2,058,319 |
| (P) - (A) | (63,677) | (60,912) | (2,730) | 12,291 | (115,027) |
| ADJUSTMENT | 31,838 | 30,456 | 1,365 | (6,146) | 57,513 |

Table 7

BALANCED INTERNAL-EXTERNAL TRIPS USING ADJUSTMENT FROM TABLE 6

BL2: Redlands Buildout (Revised 6/20/95)

| | GATEWAY PRODUCTIONS (X-I TRIPS) | | | | |
|---|---|---|---|---|---|
| GATEWAY | HBW | HBS | HBO | NHB | TOTAL |
| 180 SR 330 | 3,268 | 345 | 543 | 886 | 5,042 |
| 181 SR 38 | 1,563 | 264 | 414 | 424 | 2,666 |
| 182 I-10 East | 30,291 | 15,495 | 24,361 | 20,370 | 90,517 |
| 183 SR 60 West | 8,998 | 4,285 | 6,737 | 5,386 | 25,407 |
| 184 Barton Road | 3,274 | 3,714 | 5,838 | 4,456 | 17,282 |
| 185 I-215 South | 35,737 | 14,292 | 22,468 | 23,805 | 96,302 |
| 186 I-10 West | 23,756 | 17,466 | 27,459 | 24,993 | 93,673 |
| 187 Inland Ctr | 1,659 | 1,928 | 3,031 | 2,606 | 9,224 |
| 188 Rialto Ave | 1,112 | 1,173 | 1,844 | 1,636 | 5,765 |
| 189 SR 66 | 1,926 | 2,118 | 3,329 | 3,068 | 10,441 |
| 190 Baseline Ave | 2,584 | 2,520 | 3,962 | 3,102 | 12,168 |
| 191 SR 30 West | 10,196 | 7,377 | 11,598 | 8,869 | 38,040 |
| 192 I-215 North | 7,514 | 5,970 | 9,386 | 7,602 | 30,472 |
| 193 SR 206 | 1,888 | 1,952 | 3,069 | 2,151 | 9,060 |
| 194 SR 18 | 2,840 | 308 | 484 | 708 | 4,339 |
| TOTAL GATEWAYS | 136,606 | 79,206 | 124,522 | 110,063 | 450,397 |

| | GATEWAY ATTRACTIONS (I-X TRIPS) | | | | | TOTAL |
|---|---|---|---|---|---|---|
| GATEWAY | HBW | HBS | HBO | NHB | TOTAL | TRIPS |
| 180 SR 330 | 243 | 51 | 478 | 620 | 1,391 | 6,433 |
| 181 SR 38 | 179 | 33 | 315 | 396 | 923 | 3,589 |
| 182 I-10 East | 5,938 | 1,639 | 15,456 | 16,185 | 39,218 | 129,734 |
| 183 SR 60 West | 1,250 | 586 | 5,524 | 4,970 | 12,331 | 37,738 |
| 184 Barton Road | 710 | 349 | 3,294 | 3,289 | 7,642 | 24,925 |
| 185 I-215 South | 23,481 | 3,177 | 29,969 | 40,734 | 97,362 | 193,664 |
| 186 I-10 West | 29,467 | 2,734 | 25,789 | 40,450 | 98,440 | 192,114 |
| 187 Inland Ctr | 552 | 264 | 2,486 | 2,513 | 5,815 | 15,038 |
| 188 Rialto Ave | 468 | 140 | 1,316 | 1,565 | 3,489 | 9,254 |
| 189 SR 66 | 1,018 | 263 | 2,483 | 3,121 | 6,886 | 17,327 |
| 190 Baseline Ave | 781 | 251 | 2,369 | 2,597 | 5,997 | 18,165 |
| 191 SR 30 West | 2,470 | 565 | 5,334 | 6,761 | 15,130 | 53,170 |
| 192 I-215 North | 2,778 | 658 | 6,203 | 7,725 | 17,363 | 47,835 |
| 193 SR 206 | 287 | 197 | 1,860 | 1,616 | 3,961 | 13,021 |
| 194 SR 18 | 399 | 37 | 346 | 737 | 1,519 | 5,858 |
| TOTAL GATEWAYS | 70,022 | 10,943 | 103,221 | 133,280 | 317,466 | 767,863 |

# APPENDIX B
# General Plan Buildout Land Uses and Trip Generation

Table 1
LAND USE INPUTS
A94: 1994 Base Year

| TRAFFIC ZONE | RESIDENTIAL Low Density Units | RESIDENTIAL Med Density Units | RESIDENTIAL Mbl Homes Units | RETAIL Low KSF | RETAIL Medium KSF | RETAIL High KSF | HOTEL Rooms | OFFICE KSF | SERVICE KSF |
|---|---|---|---|---|---|---|---|---|---|
| 1 Redlands | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 2 Redlands | 2 | 1 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 3 Redlands | 2 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 23.522 | 0.000 |
| 4 Redlands | 22 | 0 | 1 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 5 Redlands | 342 | 8 | 30 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 6 Redlands | 879 | 46 | 2 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 7 Redlands | 22 | 15 | 0 | 0.000 | 0.000 | 0.000 | 0 | 129.373 | 0.000 |
| 8 Redlands | 8 | 0 | 3 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 9 Redlands | 673 | 71 | 312 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 4.600 |
| 10 Redlands | 142 | 208 | 2 | 0.000 | 40.000 | 0.000 | 0 | 40.000 | 0.000 |
| 11 Redlands | 470 | 193 | 4 | 0.000 | 0.000 | 0.000 | 0 | 10.000 | 0.000 |
| 12 Redlands | 134 | 2 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 13 Redlands | 2 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 14 Redlands | 4 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 15 Redlands | 2 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 16 Redlands | 2 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 17 Redlands | 6 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 18 Redlands | 0 | 0 | 0 | 58.458 | 0.000 | 0.000 | 0 | 151.055 | 37.000 |
| 19 Redlands | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 174.804 | 12.000 |
| 20 Redlands | 1 | 2 | 0 | 28.924 | 0.000 | 0.000 | 0 | 0.000 | 9.801 |
| 21 Redlands | 59 | 67 | 0 | 92.434 | 0.000 | 1.310 | 0 | 16.988 | 12.920 |
| 22 Redlands | 567 | 63 | 3 | 0.000 | 1.394 | 0.000 | 0 | 29.192 | 61.909 |
| 23 Redlands | 406 | 659 | 1 | 16.380 | 16.380 | 0.440 | 0 | 0.000 | 8.494 |
| 24 Redlands | 0 | 414 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 25 Redlands | 51 | 197 | 1 | 0.700 | 0.000 | 0.000 | 0 | 0.000 | 1.307 |
| 26 Redlands | 1,058 | 4 | 106 | 0.000 | 50.000 | 0.000 | 0 | 0.000 | 0.000 |
| 27 Redlands | 739 | 124 | 266 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 28 Redlands | 576 | 41 | 1 | 0.000 | 60.000 | 0.000 | 0 | 0.000 | 0.000 |
| 29 Redlands | 301 | 1 | 15 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 27.500 |
| 30 Redlands | 648 | 227 | 0 | 60.000 | 0.000 | 0.000 | 0 | 0.000 | 48.267 |
| 31 Redlands | 142 | 37 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 23.000 |
| 32 Redlands | 93 | 24 | 0 | 257.560 | 110.000 | 32.850 | 0 | 576.600 | 38.295 |
| 33 Redlands | 30 | 5 | 33 | 10.000 | 0.000 | 0.000 | 0 | 115.000 | 16.801 |
| 34 Redlands | 1 | 0 | 0 | 84.071 | 2.178 | 0.000 | 66 | 0.000 | 20.599 |
| 35 Redlands | 2 | 0 | 0 | 279.310 | 139.650 | 0.000 | 0 | 48.352 | 5.227 |
| 36 Redlands | 1 | 1 | 0 | 113.692 | 38.310 | 0.740 | 0 | 0.000 | 40.511 |
| 37 Redlands | 59 | 238 | 0 | 213.120 | 5.430 | 5.010 | 0 | 0.000 | 203.267 |
| 38 Redlands | 29 | 108 | 2 | 13.678 | 2.560 | 0.000 | 0 | 18.295 | 3.267 |
| 39 Redlands | 44 | 2 | 1 | 35.284 | 0.000 | 0.000 | 0 | 0.000 | 60.000 |
| 40 Redlands | 12 | 0 | 0 | 181.577 | 0.000 | 0.000 | 0 | 0.000 | 28.750 |
| 41 Redlands | 6 | 12 | 34 | 117.176 | 0.000 | 0.000 | 0 | 5.227 | 7.187 |
| 42 Redlands | 22 | 1,205 | 0 | 79.715 | 0.000 | 0.000 | 0 | 9.148 | 10.000 |
| 43 Redlands | 49 | 1,114 | 2 | 87.904 | 0.000 | 0.000 | 0 | 174.516 | 26.136 |
| 44 Redlands | 288 | 352 | 0 | 139.915 | 8.973 | 5.750 | 0 | 183.635 | 1.960 |
| 45 Redlands | 154 | 562 | 0 | 18.208 | 0.000 | 0.000 | 0 | 92.776 | 1.307 |
| 46 Redlands | 233 | 204 | 0 | 0.000 | 150.000 | 0.000 | 0 | 9.148 | 0.000 |

Table 1
LAND USE INPUTS
A94: 1994 Base Year

| TRAFFIC ZONE | RESIDENTIAL Low Density Units | RESIDENTIAL Med Density Units | RESIDENTIAL Mbl Homes Units | RETAIL Low KSF | RETAIL Medium KSF | RETAIL High KSF | HOTEL Rooms | OFFICE KSF | SERVICE KSF |
|---|---|---|---|---|---|---|---|---|---|
| 47 Redlands | 371 | 6 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 48 Redlands | 463 | 231 | 1 | 0.000 | 0.000 | 0.000 | 0 | 52.272 | 0.000 |
| 49 Redlands | 700 | 107 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 10.000 |
| 50 Redlands | 405 | 27 | 0 | 15.682 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 51 Redlands | 861 | 738 | 0 | 30.318 | 0.000 | 0.000 | 0 | 110.169 | 5.881 |
| 52 Redlands | 72 | 2 | 1 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 53 Redlands | 672 | 6 | 3 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 54 Redlands | 21 | 1 | 8 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 55 Redlands | 1,158 | 13 | 0 | 0.000 | 0.000 | 0.000 | 0 | 10.454 | 0.000 |
| 56 Redlands | 290 | 2 | 7 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 57 Redlands | 429 | 2 | 0 | 0.261 | 0.000 | 0.000 | 0 | 0.000 | 2.000 |
| 58 Redlands | 757 | 5 | 1 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 8.494 |
| 59 Redlands | 209 | 5 | 2 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 6.000 |
| 60 Redlands | 133 | 6 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 61 Redlands | 20 | 0 | 1 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 62 Redlands | 441 | 33 | 0 | 53.656 | 6.447 | 0.000 | 0 | 0.000 | 49.000 |
| 63 Redlands | 572 | 389 | 1 | 45.738 | 0.087 | 0.000 | 0 | 0.000 | 13.148 |
| 64 Redlands | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 65 Redlands | 52 | 29 | 0 | 41.382 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 66 Redlands | 93 | 1 | 1 | 0.087 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 67 Redlands | 412 | 105 | 282 | 18.731 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 68 Redlands | 1 | 0 | 5 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 69 Redlands | 373 | 59 | 1 | 0.000 | 72.570 | 0.000 | 0 | 0.000 | 0.000 |
| 70 Redlands | 182 | 3 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 71 Redlands | 95 | 83 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 1.310 |
| 72 Redlands | 75 | 423 | 61 | 6.270 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 73 Redlands | 137 | 141 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 74 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 75 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 76 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 77 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 78 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 79 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 80 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 81 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 82 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 83 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 84 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 85 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 86 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 87 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 88 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 89 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 90 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 91 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 92 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |

Table 1
LAND USE INPUTS
A94: 1994 Base Year

| TRAFFIC ZONE | RESIDENTIAL Low Density Units | RESIDENTIAL Med Density Units | RESIDENTIAL Mbl Homes Units | RETAIL Low KSF | RETAIL Medium KSF | RETAIL High KSF | HOTEL Rooms | OFFICE KSF | SERVICE KSF |
|---|---|---|---|---|---|---|---|---|---|
| 93 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 94 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 95 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 96 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 97 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 98 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| 99 NOT USED | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| TOTAL | 17,277 | 8,624 | 1,194 | 2,100.229 | 703.979 | 46.100 | 66 | 1,980.527 | 805.937 |

Table 1
LAND USE INPUTS
A94: 1994 Base Y

| TRAFFIC ZONE | INDUSTRIAL Light KSF | INDUSTRIAL General KSF | HOSPITAL KSF | SCHOOL Elem/Jr.High Students | SCHOOL High Students | SCHOOL University Students | OTHER Trips | Description |
|---|---|---|---|---|---|---|---|---|
| 1 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 2 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 3 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 4 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 5 Redlands | 45.302 | 18.820 | 0.000 | 0 | 0 | 0 | 0 | |
| 6 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 7 Redlands | 8.712 | 0.000 | 0.000 | 0 | 0 | 0 | 580 | Airport |
| 8 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 9 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Misc |
| 10 Redlands | 0.000 | 0.000 | 0.000 | 2,015 | 0 | 0 | 109 | School Office |
| 11 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | School Office |
| 12 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 53 | |
| 13 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 14 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 10 | Misc. |
| 15 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 16 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 17 Redlands | 235.890 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 18 Redlands | 87.991 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Misc. |
| 19 Redlands | 9.583 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Misc. |
| 20 Redlands | 100.188 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 21 Redlands | 139.392 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Misc. |
| 22 Redlands | 12.197 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Misc. |
| 23 Redlands | 0.000 | 0.000 | 0.000 | 100 | 0 | 0 | 0 | Private School |
| 24 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 700 | 0 | |
| 25 Redlands | 0.000 | 0.000 | 5.881 | 0 | 0 | 500 | 140 | |
| 26 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 27 Redlands | 0.000 | 0.000 | 0.000 | 742 | 0 | 0 | 45 | |
| 28 Redlands | 0.000 | 50.000 | 0.000 | 1,193 | 0 | 0 | 0 | Ag. Facility |
| 29 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Misc. |
| 30 Redlands | 0.000 | 0.000 | 42.035 | 0 | 0 | 0 | 162 | Misc. |
| 31 Redlands | 0.000 | 0.000 | 0.000 | 0 | 3,025 | 0 | 0 | Misc. |
| 32 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 100 | Church, Misc. |
| 33 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Misc. |
| 34 Redlands | 47.916 | 0.000 | 0.000 | 0 | 219 | 0 | 100 | Recreation |
| 35 Redlands | 27.007 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 36 Redlands | 87.120 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 37 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Regional P.O. |
| 38 Redlands | 235.169 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 39 Redlands | 0.000 | 0.000 | 93.218 | 0 | 0 | 0 | 0 | Misc. |
| 40 Redlands | 60.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 41 Redlands | 196.538 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 42 Redlands | 273.358 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Misc. |
| 43 Redlands | 416.434 | 0.000 | 0.000 | 0 | 0 | 0 | 131 | Recreation |
| 44 Redlands | 0.000 | 0.000 | 1.090 | 0 | 0 | 0 | 255 | Churches(2), Pub. Off. |
| 45 Redlands | 0.000 | 0.000 | 2.100 | 0 | 0 | 0 | 200 | Churches(2) |
| 46 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 100 | Church |

Table 1
LAND USE INPUTS
A94: 1994 Base Y

| TRAFFIC ZONE | INDUSTRIAL Light KSF | INDUSTRIAL General KSF | HOSPITAL KSF | SCHOOL Elem/Jr.High Students | SCHOOL High Students | SCHOOL University Students | OTHER Trips | Description |
|---|---|---|---|---|---|---|---|---|
| 47 Redlands | 0.000 | 0.000 | 0.000 | 695 | 0 | 0 | 0 | |
| 48 Redlands | 0.000 | 0.000 | 10.250 | 453 | 0 | 0 | 200 | Churches(2) |
| 49 Redlands | 0.000 | 0.000 | 0.000 | 1,188 | 0 | 0 | 0 | School Facility |
| 50 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 100 | Church |
| 51 Redlands | 0.000 | 0.000 | 286.000 | 771 | 0 | 0 | 55 | Misc. Office |
| 52 Redlands | 0.000 | 0.000 | 109.553 | 0 | 0 | 0 | 0 | |
| 53 Redlands | 0.000 | 0.000 | 34.630 | 0 | 0 | 0 | 0 | |
| 54 Redlands | 0.000 | 350.000 | 0.000 | 0 | 0 | 0 | 0 | Co. Landfill |
| 55 Redlands | 0.000 | 0.000 | 0.000 | 457 | 0 | 0 | 68 | |
| 56 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 57 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 1,000 | Water Facility, Golf |
| 58 Redlands | 0.000 | 0.000 | 0.000 | 622 | 0 | 0 | 100 | Church |
| 59 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Misc. |
| 60 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 61 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 62 Redlands | 425.100 | 62.726 | 0.000 | 0 | 0 | 0 | 0 | Misc. |
| 63 Redlands | 28.750 | 300.000 | 0.000 | 0 | 0 | 0 | 0 | Misc. |
| 64 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 65 Redlands | 0.000 | 0.000 | 0.000 | 630 | 0 | 0 | 0 | |
| 66 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 67 Redlands | 23.522 | 19.166 | 14.266 | 0 | 0 | 0 | 0 | |
| 68 Redlands | 80.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Split of 1 |
| 69 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Split of 24 |
| 70 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Split of 24 |
| 71 Redlands | 0.000 | 0.000 | 0.000 | 1013 | 0 | 0 | 0 | Split of 25 |
| 72 Redlands | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Split of 25 |
| 73 Redlands | 135.080 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | Split of 62 |
| 74 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 75 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 76 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 77 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 78 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 79 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 80 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 81 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 82 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 83 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 84 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 85 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 86 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 87 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 88 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 89 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 90 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 91 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 92 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |

Table 1
LAND USE INPUTS
A94: 1994 Base Y

| TRAFFIC ZONE | INDUSTRIAL Light KSF | INDUSTRIAL General KSF | HOSPITAL KSF | SCHOOL Elem/Jr.High Students | SCHOOL High Students | SCHOOL University Students | OTHER Trips | Description |
|---|---|---|---|---|---|---|---|---|
| 93 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 94 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 95 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 96 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 97 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 98 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| 99 NOT USED | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | |
| TOTAL | 2,675.250 | 800.713 | 599.024 | 9,879 | 3,244 | 1,200 | 3,509 | |

Table 2
TRIP GENERATION RATES

| | PRODUCTIONS | | | | |
|---|---|---|---|---|---|
| LAND USE | HBW | HBS | HBO | NHB | TOTAL |
| Residential: Low | 2.70 | 3.30 | 2.30 | 0.30 | 8.60 |
| Residential: Med | 2.00 | 2.40 | 1.80 | 0.20 | 6.40 |
| Residential: MH | 1.20 | 1.50 | 1.20 | 0.20 | 4.10 |
| Retail: Low | 0.00 | 0.00 | 0.00 | 9.40 | 9.40 |
| Retail: Medium | 0.00 | 0.00 | 0.00 | 14.10 | 14.10 |
| Retail: High | 0.00 | 0.00 | 0.00 | 40.20 | 40.20 |
| Hotel | 0.00 | 0.00 | 0.00 | 2.40 | 2.40 |
| Office | 0.00 | 0.00 | 0.00 | 1.35 | 1.35 |
| Service | 0.00 | 0.00 | 0.00 | 1.20 | 1.20 |
| Industrial: Lt | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 |
| Industrial: Gen | 0.00 | 0.00 | 0.00 | 0.35 | 0.35 |
| Hospital | 0.00 | 0.00 | 0.00 | 0.60 | 0.60 |
| School: Elem/JH | 0.00 | 0.00 | 0.00 | 0.14 | 0.14 |
| School: High | 0.00 | 0.00 | 0.00 | 0.21 | 0.21 |
| School: Univrsty | 0.00 | 0.00 | 0.00 | 0.22 | 0.22 |
| Other | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

Table 2
TRIP GENERATION

| LAND USE | ATTRACTIONS HBW | HBS | HBO | NHB | TOTAL | TOTAL P+A |
|---|---|---|---|---|---|---|
| Residential: Low | 0.00 | 0.00 | 1.10 | 0.30 | 1.40 | 10.00 |
| Residential: Med | 0.00 | 0.00 | 0.80 | 0.20 | 1.00 | 7.40 |
| Residential: MH | 0.00 | 0.00 | 0.50 | 0.20 | 0.70 | 4.80 |
| Retail: Low | 1.70 | 19.00 | 0.50 | 9.40 | 30.60 | 40.00 |
| Retail: Medium | 3.40 | 42.40 | 1.00 | 14.10 | 60.90 | 75.00 |
| Retail: High | 3.40 | 40.20 | 1.00 | 40.20 | 84.80 | 125.00 |
| Hotel | 1.10 | 0.00 | 2.80 | 2.40 | 6.30 | 8.70 |
| Office | 6.80 | 0.00 | 2.00 | 1.35 | 10.15 | 11.50 |
| Service | 5.10 | 1.00 | 1.50 | 1.20 | 8.80 | 10.00 |
| Industrial: Lt | 3.90 | 0.00 | 1.10 | 1.00 | 6.00 | 7.00 |
| Industrial: Gen | 3.10 | 0.00 | 0.00 | 0.35 | 3.45 | 3.80 |
| Hospital | 10.20 | 0.00 | 5.30 | 0.60 | 16.10 | 16.70 |
| School: Elem/JH | 0.14 | 0.00 | 0.58 | 0.14 | 0.86 | 1.00 |
| School: High | 0.14 | 0.00 | 0.84 | 0.21 | 1.19 | 1.40 |
| School: Univrsty | 0.26 | 0.00 | 0.90 | 0.22 | 1.38 | 1.60 |
| Other | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 |

Table 3-P
REDLANDS PRODUCTIONS
A94: 1994 Base Year

| ID | ZONE | RECORD | HBW | HBS | HBO | NHB |
|---|---|---|---|---|---|---|
| GP | 1 | 1 | 0 | 0 | 0 | 0 |
| GP | 2 | 1 | 7 | 9 | 6 | 1 |
| GP | 3 | 1 | 5 | 7 | 5 | 32 |
| GP | 4 | 1 | 61 | 74 | 52 | 7 |
| GP | 5 | 1 | 975 | 1193 | 837 | 162 |
| GP | 6 | 1 | 2468 | 3014 | 2107 | 273 |
| GP | 7 | 1 | 89 | 109 | 78 | 193 |
| GP | 8 | 1 | 25 | 31 | 22 | 3 |
| GP | 9 | 1 | 2334 | 2859 | 2050 | 284 |
| GP | 10 | 1 | 802 | 971 | 703 | 985 |
| GP | 11 | 1 | 1660 | 2020 | 1433 | 194 |
| GP | 12 | 1 | 366 | 447 | 312 | 41 |
| GP | 13 | 1 | 5 | 7 | 5 | 1 |
| GP | 14 | 1 | 11 | 13 | 9 | 1 |
| GP | 15 | 1 | 5 | 7 | 5 | 1 |
| GP | 16 | 1 | 5 | 7 | 5 | 1 |
| GP | 17 | 1 | 16 | 20 | 14 | 238 |
| GP | 18 | 1 | 0 | 0 | 0 | 886 |
| GP | 19 | 1 | 0 | 0 | 0 | 260 |
| GP | 20 | 1 | 7 | 8 | 6 | 385 |
| GP | 21 | 1 | 293 | 356 | 256 | 1130 |
| GP | 22 | 1 | 1661 | 2027 | 1421 | 329 |
| GP | 23 | 1 | 2415 | 2923 | 2121 | 681 |
| GP | 24 | 1 | 828 | 994 | 745 | 237 |
| GP | 25 | 1 | 533 | 643 | 473 | 177 |
| GP | 26 | 1 | 2992 | 3660 | 2568 | 1044 |
| GP | 27 | 1 | 2563 | 3135 | 2242 | 404 |
| GP | 28 | 1 | 1638 | 2001 | 1400 | 1212 |
| GP | 29 | 1 | 833 | 1018 | 712 | 127 |
| GP | 30 | 1 | 2204 | 2683 | 1899 | 887 |
| GP | 31 | 1 | 457 | 557 | 393 | 713 |
| GP | 32 | 1 | 299 | 365 | 257 | 6150 |
| GP | 33 | 1 | 131 | 161 | 118 | 286 |
| GP | 34 | 1 | 3 | 3 | 2 | 1098 |
| GP | 35 | 1 | 5 | 7 | 5 | 4694 |
| GP | 36 | 1 | 5 | 6 | 4 | 1775 |
| GP | 37 | 1 | 635 | 766 | 564 | 2591 |
| GP | 38 | 1 | 297 | 358 | 264 | 459 |
| GP | 39 | 1 | 124 | 152 | 106 | 473 |
| GP | 40 | 1 | 32 | 40 | 28 | 1805 |
| GP | 41 | 1 | 81 | 100 | 76 | 1325 |
| GP | 42 | 1 | 2469 | 2965 | 2220 | 1295 |
| GP | 43 | 1 | 2363 | 2838 | 2120 | 1748 |
| GP | 44 | 1 | 1482 | 1795 | 1296 | 2081 |
| GP | 45 | 1 | 1540 | 1857 | 1366 | 458 |
| GP | 46 | 1 | 1037 | 1259 | 903 | 2238 |

Table 3-P
REDLANDS PRODUCTIONS
A94: 1994 Base Year

| ID | ZONE | RECORD | HBW | HBS | HBO | NHB |
|---|---|---|---|---|---|---|
| GP | 47 | 1 | 1014 | 1239 | 864 | 210 |
| GP | 48 | 1 | 1713 | 2084 | 1482 | 325 |
| GP | 49 | 1 | 2104 | 2567 | 1803 | 410 |
| GP | 50 | 1 | 1148 | 1401 | 980 | 274 |
| GP | 51 | 1 | 3801 | 4613 | 3309 | 1126 |
| GP | 52 | 1 | 200 | 244 | 170 | 88 |
| GP | 53 | 1 | 1830 | 2237 | 1560 | 224 |
| GP | 54 | 1 | 68 | 84 | 60 | 131 |
| GP | 55 | 1 | 3153 | 3853 | 2687 | 428 |
| GP | 56 | 1 | 795 | 972 | 679 | 89 |
| GP | 57 | 1 | 1162 | 1421 | 990 | 134 |
| GP | 58 | 1 | 2055 | 2512 | 1751 | 326 |
| GP | 59 | 1 | 577 | 705 | 492 | 71 |
| GP | 60 | 1 | 371 | 453 | 317 | 41 |
| GP | 61 | 1 | 55 | 68 | 47 | 6 |
| GP | 62 | 1 | 1257 | 1535 | 1074 | 1240 |
| GP | 63 | 1 | 2324 | 2823 | 2017 | 830 |
| GP | 64 | 1 | 0 | 0 | 0 | 0 |
| GP | 65 | 1 | 198 | 241 | 172 | 499 |
| GP | 66 | 1 | 254 | 311 | 217 | 29 |
| GP | 67 | 1 | 1661 | 2035 | 1475 | 416 |
| GP | 68 | 1 | 9 | 11 | 8 | 81 |
| GP | 69 | 1 | 1126 | 1374 | 965 | 1147 |
| GP | 70 | 1 | 497 | 608 | 424 | 55 |
| GP | 71 | 1 | 423 | 513 | 368 | 188 |
| GP | 72 | 1 | 1122 | 1354 | 1007 | 178 |
| GP | 73 | 1 | 652 | 791 | 569 | 204 |
| GP | 74 | 1 | 0 | 0 | 0 | 0 |
| GP | 75 | 1 | 0 | 0 | 0 | 0 |
| GP | 76 | 1 | 0 | 0 | 0 | 0 |
| GP | 77 | 1 | 0 | 0 | 0 | 0 |
| GP | 78 | 1 | 0 | 0 | 0 | 0 |
| GP | 79 | 1 | 0 | 0 | 0 | 0 |
| GP | 80 | 1 | 0 | 0 | 0 | 0 |
| GP | 81 | 1 | 0 | 0 | 0 | 0 |
| GP | 82 | 1 | 0 | 0 | 0 | 0 |
| GP | 83 | 1 | 0 | 0 | 0 | 0 |
| GP | 84 | 1 | 0 | 0 | 0 | 0 |
| GP | 85 | 1 | 0 | 0 | 0 | 0 |
| GP | 86 | 1 | 0 | 0 | 0 | 0 |
| GP | 87 | 1 | 0 | 0 | 0 | 0 |
| GP | 88 | 1 | 0 | 0 | 0 | 0 |
| GP | 89 | 1 | 0 | 0 | 0 | 0 |
| GP | 90 | 1 | 0 | 0 | 0 | 0 |
| GP | 91 | 1 | 0 | 0 | 0 | 0 |
| GP | 92 | 1 | 0 | 0 | 0 | 0 |

Table 3-P
REDLANDS PRODUCTIONS
A94: 1994 Base Year

| ID | ZONE RECORD | HBW | HBS | HBO | NHB |
|---|---|---|---|---|---|
| GP | 93 1 | 0 | 0 | 0 | 0 |
| GP | 94 1 | 0 | 0 | 0 | 0 |
| GP | 95 1 | 0 | 0 | 0 | 0 |
| GP | 96 1 | 0 | 0 | 0 | 0 |
| GP | 97 1 | 0 | 0 | 0 | 0 |
| GP | 98 1 | 0 | 0 | 0 | 0 |
| GP | 99 1 | 0 | 0 | 0 | 0 |
| TOTAL REDLANDS PRODUCTIONS | | 65,329 | 79,503 | 56,693 | 48,111 |

Table 3-A
REDLANDS ATTRACTIONS
A94: 1994 Base Year

| ID | ZONE RECORD | HBW | HBS | HBO | NHB | TOTAL |
|---|---|---|---|---|---|---|
| GA | 1 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 2 1 | 0 | 0 | 3 | 1 | 27 |
| GA | 3 1 | 160 | 0 | 49 | 32 | 291 |
| GA | 4 1 | 0 | 0 | 25 | 7 | 225 |
| GA | 5 1 | 235 | 0 | 447 | 162 | 4,012 |
| GA | 6 1 | 0 | 0 | 1005 | 273 | 9,140 |
| GA | 7 1 | 914 | 0 | 885 | 193 | 2,460 |
| GA | 8 1 | 0 | 0 | 10 | 3 | 94 |
| GA | 9 1 | 23 | 5 | 960 | 284 | 8,799 |
| GA | 10 1 | 690 | 1696 | 1722 | 985 | 8,553 |
| GA | 11 1 | 68 | 0 | 693 | 194 | 6,262 |
| GA | 12 1 | 0 | 0 | 202 | 41 | 1,408 |
| GA | 13 1 | 0 | 0 | 2 | 1 | 20 |
| GA | 14 1 | 0 | 0 | 14 | 1 | 50 |
| GA | 15 1 | 0 | 0 | 2 | 1 | 20 |
| GA | 16 1 | 0 | 0 | 2 | 1 | 20 |
| GA | 17 1 | 920 | 0 | 266 | 238 | 1,711 |
| GA | 18 1 | 1658 | 1148 | 484 | 886 | 5,061 |
| GA | 19 1 | 1287 | 12 | 378 | 260 | 2,197 |
| GA | 20 1 | 490 | 559 | 142 | 385 | 1,981 |
| GA | 21 1 | 887 | 1822 | 373 | 1130 | 6,247 |
| GA | 22 1 | 567 | 121 | 842 | 329 | 7,295 |
| GA | 23 1 | 142 | 1032 | 1070 | 681 | 11,065 |
| GA | 24 1 | 182 | 0 | 961 | 237 | 4,184 |
| GA | 25 1 | 198 | 15 | 837 | 177 | 3,052 |
| GA | 26 1 | 170 | 2120 | 1270 | 1044 | 14,868 |
| GA | 27 1 | 104 | 0 | 1521 | 404 | 10,372 |
| GA | 28 1 | 526 | 2544 | 1419 | 1212 | 11,951 |
| GA | 29 1 | 140 | 28 | 381 | 127 | 3,364 |
| GA | 30 1 | 777 | 1188 | 1382 | 887 | 11,906 |
| GA | 31 1 | 541 | 23 | 2761 | 713 | 6,159 |
| GA | 32 1 | 5040 | 10917 | 1704 | 6150 | 30,880 |
| GA | 33 1 | 885 | 207 | 314 | 286 | 2,386 |
| GA | 34 1 | 546 | 1710 | 598 | 1098 | 5,058 |
| GA | 35 1 | 1410 | 11233 | 416 | 4694 | 22,464 |
| GA | 36 1 | 872 | 3855 | 254 | 1775 | 8,546 |
| GA | 37 1 | 1434 | 4684 | 677 | 2591 | 13,942 |
| GA | 38 1 | 1090 | 372 | 429 | 459 | 3,727 |
| GA | 39 1 | 1317 | 730 | 652 | 473 | 4,028 |
| GA | 40 1 | 689 | 3479 | 213 | 1805 | 8,091 |
| GA | 41 1 | 1038 | 2234 | 329 | 1325 | 6,507 |
| GA | 42 1 | 1315 | 1525 | 1362 | 1295 | 14,444 |
| GA | 43 1 | 3094 | 1696 | 1968 | 1748 | 17,574 |
| GA | 44 1 | 1558 | 3272 | 1314 | 2081 | 14,878 |
| GA | 45 1 | 690 | 347 | 1027 | 458 | 7,742 |
| GA | 46 1 | 572 | 6360 | 688 | 2238 | 15,295 |

Table 3-A
REDLANDS ATTRACTIONS
A94: 1994 Base Year

| ID | ZONE | RECORD | HBW | HBS | HBO | NHB | TOTAL |
|---|---|---|---|---|---|---|---|
| GA | 47 | 1 | 97 | 0 | 816 | 210 | 4,449 |
| GA | 48 | 1 | 523 | 0 | 1316 | 325 | 7,770 |
| GA | 49 | 1 | 217 | 10 | 1560 | 410 | 9,080 |
| GA | 50 | 1 | 27 | 298 | 575 | 274 | 4,977 |
| GA | 51 | 1 | 3856 | 582 | 3800 | 1126 | 22,212 |
| GA | 52 | 1 | 1117 | 0 | 662 | 88 | 2,569 |
| GA | 53 | 1 | 353 | 0 | 929 | 224 | 7,357 |
| GA | 54 | 1 | 1085 | 0 | 28 | 131 | 1,586 |
| GA | 55 | 1 | 135 | 0 | 1639 | 428 | 12,322 |
| GA | 56 | 1 | 0 | 0 | 324 | 89 | 2,948 |
| GA | 57 | 1 | 11 | 7 | 1477 | 134 | 5,335 |
| GA | 58 | 1 | 130 | 8 | 1311 | 326 | 8,419 |
| GA | 59 | 1 | 31 | 6 | 244 | 71 | 2,197 |
| GA | 60 | 1 | 0 | 0 | 151 | 41 | 1,374 |
| GA | 61 | 1 | 0 | 0 | 23 | 6 | 205 |
| GA | 62 | 1 | 2215 | 1342 | 1086 | 1240 | 10,988 |
| GA | 63 | 1 | 1187 | 886 | 1015 | 830 | 11,912 |
| GA | 64 | 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 65 | 1 | 159 | 786 | 466 | 499 | 3,020 |
| GA | 66 | 1 | 0 | 2 | 104 | 29 | 946 |
| GA | 67 | 1 | 329 | 356 | 789 | 416 | 7,476 |
| GA | 68 | 1 | 312 | 0 | 92 | 81 | 594 |
| GA | 69 | 1 | 247 | 3077 | 531 | 1147 | 9,614 |
| GA | 70 | 1 | 0 | 0 | 203 | 55 | 1,842 |
| GA | 71 | 1 | 149 | 1 | 760 | 188 | 2,590 |
| GA | 72 | 1 | 11 | 119 | 455 | 178 | 4,424 |
| GA | 73 | 1 | 527 | 0 | 412 | 204 | 3,359 |
| GA | 74 | 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 75 | 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 76 | 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 77 | 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 78 | 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 79 | 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 80 | 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 81 | 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 82 | 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 83 | 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 84 | 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 85 | 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 86 | 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 87 | 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 88 | 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 89 | 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 90 | 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 91 | 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 92 | 1 | 0 | 0 | 0 | 0 | 0 |

Table 3-A
REDLANDS ATTRACTIONS
A94: 1994 Base Year

| ID | ZONE RECORD | HBW | HBS | HBO | NHB | TOTAL |
|---|---|---|---|---|---|---|
| GA | 93 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 94 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 95 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 96 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 97 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 98 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 99 1 | 0 | 0 | 0 | 0 | 0 |
| TOTAL REDLANDS ATTRACTIONS | | 44,946 | 72,412 | 52,817 | 48,111 | 467,921 |

Table 4-P
BUFFER AREA PRODUCTIONS
Interpolation between SCAG/CTP 1990 and 2010 Vehicle Trip Tables
A94: 1994 Base Year

| ID | ZONE RECORD | HBW | HBS | HBO | NHB |
|---|---|---|---|---|---|
| Derivation from SCAG Vehicle Trips | | 100% SCAG H-W | 19% of OTHER | 48% of OTHER | 33% OTHER + O-W |
| GP | 100 1 | 4716 | 2485 | 6277 | 4719 |
| GP | 101 1 | 13954 | 9078 | 22934 | 19002 |
| GP | 102 1 | 3273 | 2958 | 7473 | 7422 |
| GP | 103 1 | 4185 | 2672 | 6751 | 5757 |
| GP | 104 1 | 262 | 287 | 724 | 514 |
| GP | 105 1 | 3191 | 1726 | 4360 | 3320 |
| GP | 106 1 | 865 | 408 | 1031 | 709 |
| GP | 107 1 | 3546 | 2857 | 7218 | 7104 |
| GP | 108 1 | 1196 | 770 | 1945 | 1679 |
| GP | 109 1 | 1872 | 1960 | 4953 | 5711 |
| GP | 110 1 | 2421 | 1936 | 4891 | 5663 |
| GP | 111 1 | 3015 | 2025 | 5115 | 4409 |
| GP | 112 1 | 2143 | 1963 | 4960 | 5017 |
| GP | 113 1 | 3082 | 1942 | 4906 | 4226 |
| GP | 114 1 | 2712 | 1686 | 4259 | 4102 |
| GP | 115 1 | 1860 | 1111 | 2806 | 2316 |
| GP | 116 1 | 2129 | 2794 | 7059 | 7976 |
| GP | 117 1 | 3027 | 2345 | 5924 | 5562 |
| GP | 118 1 | 1188 | 874 | 2209 | 2883 |
| GP | 119 1 | 2651 | 1758 | 4441 | 3965 |
| GP | 120 1 | 2296 | 1353 | 3419 | 2763 |
| GP | 121 1 | 8284 | 3991 | 10083 | 7149 |
| GP | 122 1 | 488 | 2085 | 5267 | 9888 |
| GP | 123 1 | 1098 | 974 | 2460 | 4683 |
| GP | 124 1 | 2536 | 2194 | 5542 | 5638 |
| GP | 125 1 | 440 | 1613 | 4075 | 6474 |
| GP | 126 1 | 238 | 539 | 1361 | 3339 |
| GP | 127 1 | 13 | 678 | 1714 | 2843 |
| GP | 128 1 | 28 | 1449 | 3660 | 6136 |
| GP | 129 1 | 159 | 386 | 974 | 1430 |
| GP | 130 1 | 534 | 453 | 1145 | 1380 |
| GP | 131 1 | 295 | 713 | 1801 | 2655 |
| GP | 132 1 | 862 | 1474 | 3724 | 5445 |
| GP | 133 1 | 129 | 511 | 1291 | 2664 |
| GP | 134 1 | 2262 | 1711 | 4321 | 4571 |
| GP | 135 1 | 2042 | 2744 | 6933 | 7991 |
| GP | 136 1 | 9178 | 6023 | 15215 | 15345 |
| GP | 137 1 | 1271 | 774 | 1955 | 2518 |
| GP | 138 1 | 289 | 170 | 430 | 347 |
| GP | 139 1 | 66 | 73 | 184 | 288 |
| GP | 140 1 | 4089 | 2243 | 5666 | 4321 |
| GP | 141 1 | 2601 | 1628 | 4114 | 3646 |
| GP | 142 1 | 9802 | 6523 | 16479 | 15965 |
| GP | 143 1 | 2570 | 1425 | 3601 | 2637 |

Table 4-P
BUFFER AREA PRODUCTIONS
Interpolation between SCAG/CTP 1990 and 2010 Vehicle Trip Tables
A94: 1994 Base Year

| ID | ZONE RECORD | HBW | HBS | HBO | NHB |
|---|---|---|---|---|---|
| Derivation from SCAG Vehicle Trips | | 100% SCAG H-W | 19% of OTHER | 48% of OTHER | 33% OTHER + O-W |
| GP | 144 1 | 1292 | 658 | 1663 | 1148 |
| GP | 145 1 | 2975 | 1924 | 4862 | 4555 |
| GP | 146 1 | 1242 | 968 | 2445 | 2981 |
| GP | 147 1 | 1756 | 900 | 2273 | 1636 |
| GP | 148 1 | 5 | 120 | 304 | 512 |
| GP | 149 1 | 542 | 289 | 729 | 596 |
| GP | 150 1 | 865 | 481 | 1215 | 933 |
| GP | 151 1 | 483 | 261 | 658 | 515 |
| GP | 152 1 | 133 | 123 | 311 | 406 |
| GP | 153 1 | 784 | 526 | 1328 | 1295 |
| GP | 154 1 | 297 | 164 | 414 | 324 |
| GP | 155 1 | 1559 | 1012 | 2556 | 2112 |
| GP | 156 1 | 11324 | 7401 | 18697 | 17078 |
| GP | 157 1 | 0 | 0 | 0 | 0 |
| GP | 158 1 | 0 | 0 | 0 | 0 |
| GP | 159 1 | 0 | 0 | 0 | 0 |
| GP | 160 1 | 0 | 0 | 0 | 0 |
| GP | 161 1 | 0 | 0 | 0 | 0 |
| GP | 162 1 | 0 | 0 | 0 | 0 |
| GP | 163 1 | 0 | 0 | 0 | 0 |
| GP | 164 1 | 0 | 0 | 0 | 0 |
| GP | 165 1 | 0 | 0 | 0 | 0 |
| GP | 166 1 | 0 | 0 | 0 | 0 |
| GP | 167 1 | 0 | 0 | 0 | 0 |
| GP | 168 1 | 0 | 0 | 0 | 0 |
| GP | 169 1 | 0 | 0 | 0 | 0 |
| GP | 170 1 | 0 | 0 | 0 | 0 |
| GP | 171 1 | 0 | 0 | 0 | 0 |
| GP | 172 1 | 0 | 0 | 0 | 0 |
| GP | 173 1 | 0 | 0 | 0 | 0 |
| GP | 174 1 | 0 | 0 | 0 | 0 |
| GP | 175 1 | 0 | 0 | 0 | 0 |
| GP | 176 1 | 0 | 0 | 0 | 0 |
| GP | 177 1 | 0 | 0 | 0 | 0 |
| GP | 178 1 | 0 | 0 | 0 | 0 |
| GP | 179 1 | 0 | 0 | 0 | 0 |
| TOTAL BUFFER PRODUCTIONS | | 136,112 | 100,189 | 253,108 | 256,263 |

Table 4-A
BUFFER AREA ATTRACTIONS
Interpolation between SCAG/CTP 1990 and 2010 Vehicle Trip Tables
A94: 1994 Base Year

| ID | ZONE RECORD | HBW | HBS | HBO | NHB | TOTAL |
|---|---|---|---|---|---|---|
| Derivation from SCAG | | 100% | 19% | 48% | 33% | |
| Vehicle Trips | | SCAG H-W | of OTHER | of OTHER | OTHER + O-W | |
| GA | 100 1 | 704 | 1417 | 3581 | 2839 | 26,739 |
| GA | 101 1 | 3876 | 7442 | 18802 | 14978 | 110,066 |
| GA | 102 1 | 2734 | 3665 | 9258 | 7832 | 44,614 |
| GA | 103 1 | 1250 | 2326 | 5875 | 4709 | 33,526 |
| GA | 104 1 | 34 | 153 | 386 | 286 | 2,644 |
| GA | 105 1 | 549 | 1029 | 2600 | 2069 | 18,844 |
| GA | 106 1 | 0 | 175 | 442 | 304 | 3,932 |
| GA | 107 1 | 2712 | 3172 | 8013 | 6969 | 41,590 |
| GA | 108 1 | 411 | 651 | 1644 | 1351 | 9,646 |
| GA | 109 1 | 3317 | 2667 | 6739 | 6451 | 33,672 |
| GA | 110 1 | 3871 | 2169 | 5478 | 5861 | 32,290 |
| GA | 111 1 | 1311 | 1797 | 4540 | 3810 | 26,021 |
| GA | 112 1 | 2531 | 2264 | 5721 | 5312 | 29,912 |
| GA | 113 1 | 1439 | 1484 | 3748 | 3364 | 24,191 |
| GA | 114 1 | 2571 | 1271 | 3211 | 3578 | 23,390 |
| GA | 115 1 | 643 | 786 | 1986 | 1705 | 13,214 |
| GA | 116 1 | 3487 | 4481 | 11320 | 9700 | 48,945 |
| GA | 117 1 | 2010 | 2514 | 6351 | 5449 | 33,181 |
| GA | 118 1 | 2698 | 985 | 2489 | 3121 | 16,447 |
| GA | 119 1 | 1522 | 1578 | 3986 | 3554 | 23,455 |
| GA | 120 1 | 824 | 975 | 2463 | 2112 | 16,204 |
| GA | 121 1 | 473 | 1854 | 4685 | 3466 | 39,984 |
| GA | 122 1 | 10141 | 4726 | 11938 | 14005 | 58,538 |
| GA | 123 1 | 6495 | 1016 | 2567 | 5458 | 24,751 |
| GA | 124 1 | 2791 | 2496 | 6305 | 5818 | 33,320 |
| GA | 125 1 | 4965 | 3685 | 9310 | 9142 | 39,706 |
| GA | 126 1 | 5142 | 1111 | 2807 | 4609 | 19,146 |
| GA | 127 1 | 2200 | 1815 | 4585 | 4341 | 18,190 |
| GA | 128 1 | 4517 | 3739 | 9445 | 8935 | 37,909 |
| GA | 129 1 | 960 | 826 | 2086 | 1940 | 8,762 |
| GA | 130 1 | 1072 | 569 | 1437 | 1579 | 8,169 |
| GA | 131 1 | 1754 | 1496 | 3779 | 3538 | 16,031 |
| GA | 132 1 | 4104 | 2941 | 7429 | 7290 | 33,269 |
| GA | 133 1 | 3096 | 1173 | 2964 | 3695 | 15,523 |
| GA | 134 1 | 2446 | 1961 | 4953 | 4712 | 26,936 |
| GA | 135 1 | 3270 | 4525 | 11431 | 9642 | 48,578 |
| GA | 136 1 | 10216 | 4607 | 11639 | 13505 | 85,728 |
| GA | 137 1 | 2435 | 615 | 1553 | 2392 | 13,512 |
| GA | 138 1 | 109 | 105 | 265 | 237 | 1,951 |
| GA | 139 1 | 397 | 118 | 297 | 404 | 1,826 |
| GA | 140 1 | 758 | 1369 | 3457 | 2750 | 24,652 |
| GA | 141 1 | 1374 | 1433 | 3619 | 3181 | 21,596 |
| GA | 142 1 | 8209 | 5744 | 14512 | 14130 | 91,366 |
| GA | 143 1 | 278 | 832 | 2103 | 1588 | 15,034 |

Table 4-A
BUFFER AREA ATTRACTIONS
Interpolation between SCAG/CTP 1990 and 2010 Vehicle Trip Tables
A94: 1994 Base Year

| ID | ZONE RECORD | HBW | HBS | HBO | NHB | TOTAL |
|---|---|---|---|---|---|---|
| Derivation from SCAG Vehicle Trips | | 100% SCAG H-W | 19% of OTHER | 48% of OTHER | 33% OTHER + O-W | |
| GA | 144 1 | 10 | 318 | 803 | 558 | 6,451 |
| GA | 145 1 | 2121 | 1617 | 4085 | 3860 | 26,000 |
| GA | 146 1 | 2278 | 1163 | 2938 | 3157 | 17,171 |
| GA | 147 1 | 129 | 480 | 1211 | 901 | 9,286 |
| GA | 148 1 | 415 | 315 | 796 | 770 | 3,238 |
| GA | 149 1 | 382 | 144 | 363 | 439 | 3,483 |
| GA | 150 1 | 202 | 304 | 768 | 638 | 5,407 |
| GA | 151 1 | 198 | 152 | 385 | 363 | 3,015 |
| GA | 152 1 | 408 | 181 | 457 | 508 | 2,527 |
| GA | 153 1 | 802 | 499 | 1261 | 1254 | 7,749 |
| GA | 154 1 | 124 | 86 | 217 | 208 | 1,833 |
| GA | 155 1 | 325 | 785 | 1984 | 1537 | 11,870 |
| GA | 156 1 | 6718 | 6974 | 17618 | 15474 | 101,284 |
| GA | 157 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 158 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 159 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 160 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 161 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 162 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 163 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 164 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 165 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 166 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 167 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 168 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 169 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 170 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 171 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 172 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 173 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 174 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 175 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 176 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 177 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 178 1 | 0 | 0 | 0 | 0 | 0 |
| GA | 179 1 | 0 | 0 | 0 | 0 | 0 |
| TOTAL BUFFER ATTRACTIONS | | 129,804 | 104,771 | 264,686 | 251,381 | 1,496,314 |

Table 5
UNBALANCED INTERNAL-EXTERNAL TRIPS
A94: 1994 Base Year

| GATEWAY | GATEWAY PRODUCTIONS (X-I TRIPS) HBW | HBS | HBO | NHB | TOTAL |
|---|---|---|---|---|---|
| 180 SR 330 | 2255 | 268 | 677 | 746 | 3,946 |
| 181 SR 38 | 1172 | 201 | 507 | 446 | 2,326 |
| 182 I-10 East | 9488 | 3714 | 9383 | 9374 | 31,959 |
| 183 SR 60 West | 2675 | 1017 | 2569 | 2162 | 8,423 |
| 184 Barton Road | 1955 | 1926 | 4865 | 4113 | 12,858 |
| 185 I-215 South | 15839 | 6158 | 15557 | 15880 | 53,435 |
| 186 I-10 West | 14243 | 9095 | 22976 | 21527 | 67,841 |
| 187 Inland Ctr | 1052 | 1040 | 2627 | 2406 | 7,125 |
| 188 Rialto Ave | 772 | 694 | 1753 | 1665 | 4,884 |
| 189 SR 66 | 1451 | 1294 | 3270 | 3167 | 9,182 |
| 190 Baseline Ave | 2054 | 1597 | 4035 | 3363 | 11,048 |
| 191 SR 30 West | 5442 | 3292 | 8317 | 7026 | 24,078 |
| 192 I-215 North | 2965 | 2063 | 5211 | 4795 | 15,033 |
| 193 SR 206 | 1162 | 956 | 2415 | 1856 | 6,389 |
| 194 SR 18 | 1966 | 177 | 446 | 608 | 3,196 |
| TOTAL GATEWAYS | 64,492 | 33,490 | 84,607 | 79,134 | 261,723 |

| GATEWAY | GATEWAY ATTRACTIONS (I-X TRIPS) HBW | HBS | HBO | NHB | TOTAL | TOTAL TRIPS |
|---|---|---|---|---|---|---|
| 180 SR 330 | 329 | 182 | 459 | 404 | 1,374 | 5,321 |
| 181 SR 38 | 215 | 78 | 198 | 266 | 757 | 3,084 |
| 182 I-10 East | 4740 | 3410 | 8616 | 8277 | 25,043 | 57,002 |
| 183 SR 60 West | 596 | 693 | 1750 | 1564 | 4,603 | 13,027 |
| 184 Barton Road | 888 | 1253 | 3166 | 2962 | 8,270 | 21,128 |
| 185 I-215 South | 20556 | 5926 | 14971 | 22440 | 63,893 | 117,328 |
| 186 I-10 West | 31512 | 7575 | 19136 | 27808 | 86,030 | 153,871 |
| 187 Inland Ctr | 706 | 850 | 2147 | 2075 | 5,778 | 12,903 |
| 188 Rialto Ave | 618 | 510 | 1289 | 1444 | 3,861 | 8,744 |
| 189 SR 66 | 1345 | 945 | 2389 | 2789 | 7,468 | 16,649 |
| 190 Baseline Ave | 1019 | 944 | 2385 | 2452 | 6,800 | 17,848 |
| 191 SR 30 West | 2455 | 1586 | 4007 | 4776 | 12,824 | 36,902 |
| 192 I-215 North | 3035 | 1797 | 4541 | 4996 | 14,369 | 29,403 |
| 193 SR 206 | 396 | 644 | 1627 | 1362 | 4,029 | 10,418 |
| 194 SR 18 | 362 | 123 | 311 | 634 | 1,431 | 4,628 |
| TOTAL GATEWAYS | 68,774 | 26,517 | 66,991 | 84,249 | 246,532 | 508,255 |

Table 6
INTERNAL AND EXTERNAL TRIP BALANCE
A94: 1994 Base Year

| | HBW | HBS | HBO | NHB | TOTAL |
|---|---|---|---|---|---|
| REDLANDS TRIPS | | | | | |
| Productions | 65,329 | 79,503 | 56,693 | 48,111 | 249,635 |
| Attractions | 44,946 | 72,412 | 52,817 | 48,111 | 218,286 |
| (P) - (A) | 20,383 | 7,090 | 3,876 | 0 | 31,349 |
| BUFFER TRIPS | | | | | |
| Productions | 136,112 | 100,189 | 253,108 | 256,263 | 745,672 |
| Attractions | 129,804 | 104,771 | 264,686 | 251,381 | 750,642 |
| (P) - (A) | 6,308 | (4,583) | (11,578) | 4,882 | (4,970) |
| GATEWAY TRIPS | | | | | |
| Productions | 64,492 | 33,490 | 84,607 | 79,134 | 261,723 |
| Attractions | 68,774 | 26,517 | 66,991 | 84,249 | 246,532 |
| (P) - (A) | (4,282) | 6,973 | 17,616 | (5,115) | 15,191 |
| TOTAL TRIPS | | | | | |
| Productions | 265,933 | 213,182 | 394,408 | 383,507 | 1,257,030 |
| Attractions | 243,525 | 203,701 | 384,494 | 383,740 | 1,215,460 |
| (P) - (A) | 22,408 | 9,481 | 9,914 | (233) | 41,570 |
| ADJUSTMENT | (11,204) | (4,740) | (4,957) | 116 | (20,785) |

Table 7
BALANCED INTERNAL-EXTERNAL TRIPS USING ADJUSTMENT FROM TABLE 6
A94: 1994 Base Year

| | GATEWAY PRODUCTIONS (X-I TRIPS) | | | | |
|---|---|---|---|---|---|
| GATEWAY | HBW | HBS | HBO | NHB | TOTAL |
| 180 SR 330 | 1,863 | 230 | 638 | 747 | 3,478 |
| 181 SR 38 | 968 | 172 | 478 | 447 | 2,065 |
| 182 I-10 East | 7,840 | 3,188 | 8,833 | 9,388 | 29,249 |
| 183 SR 60 West | 2,211 | 873 | 2,419 | 2,165 | 7,667 |
| 184 Barton Road | 1,615 | 1,653 | 4,580 | 4,119 | 11,967 |
| 185 I-215 South | 13,088 | 5,286 | 14,646 | 15,904 | 48,923 |
| 186 I-10 West | 11,769 | 7,807 | 21,630 | 21,559 | 62,764 |
| 187 Inland Ctr | 869 | 893 | 2,473 | 2,409 | 6,644 |
| 188 Rialto Ave | 638 | 596 | 1,650 | 1,667 | 4,551 |
| 189 SR 66 | 1,199 | 1,111 | 3,078 | 3,172 | 8,560 |
| 190 Baseline Ave | 1,697 | 1,371 | 3,798 | 3,368 | 10,234 |
| 191 SR 30 West | 4,497 | 2,826 | 7,830 | 7,037 | 22,190 |
| 192 I-215 North | 2,450 | 1,771 | 4,905 | 4,802 | 13,928 |
| 193 SR 206 | 960 | 821 | 2,273 | 1,858 | 5,913 |
| 194 SR 18 | 1,624 | 152 | 420 | 609 | 2,804 |
| TOTAL GATEWAYS | 53,288 | 28,750 | 79,650 | 79,250 | 240,938 |

| | GATEWAY ATTRACTIONS (I-X TRIPS) | | | | | TOTAL |
|---|---|---|---|---|---|---|
| GATEWAY | HBW | HBS | HBO | NHB | TOTAL | TRIPS |
| 180 SR 330 | 383 | 214 | 493 | 404 | 1,494 | 4,972 |
| 181 SR 38 | 250 | 92 | 213 | 265 | 821 | 2,886 |
| 182 I-10 East | 5,513 | 4,020 | 9,253 | 8,265 | 27,051 | 56,300 |
| 183 SR 60 West | 693 | 817 | 1,880 | 1,562 | 4,952 | 12,619 |
| 184 Barton Road | 1,033 | 1,477 | 3,400 | 2,958 | 8,869 | 20,836 |
| 185 I-215 South | 23,905 | 6,985 | 16,079 | 22,409 | 69,378 | 118,302 |
| 186 I-10 West | 36,645 | 8,929 | 20,552 | 27,769 | 93,896 | 156,660 |
| 187 Inland Ctr | 821 | 1,002 | 2,306 | 2,072 | 6,201 | 12,846 |
| 188 Rialto Ave | 718 | 601 | 1,384 | 1,442 | 4,146 | 8,697 |
| 189 SR 66 | 1,564 | 1,114 | 2,565 | 2,785 | 8,029 | 16,588 |
| 190 Baseline Ave | 1,185 | 1,113 | 2,561 | 2,449 | 7,308 | 17,542 |
| 191 SR 30 West | 2,855 | 1,869 | 4,303 | 4,769 | 13,797 | 35,987 |
| 192 I-215 North | 3,530 | 2,119 | 4,876 | 4,989 | 15,514 | 29,442 |
| 193 SR 206 | 461 | 759 | 1,747 | 1,360 | 4,327 | 10,240 |
| 194 SR 18 | 421 | 145 | 334 | 634 | 1,535 | 4,339 |
| TOTAL GATEWAYS | 79,978 | 31,258 | 71,948 | 84,132 | 267,317 | 508,255 |

# APPENDIX C
## Cost Calculations

**REDLANDS GENERAL PLAN -- COST OF IMPROVEMENTS**

ASSUME COST OF WIDENING (PER LANE-MILE) = $500,000
ASSUME COST OF UPGRADING OR MEDIAN (PER MILE) = $500,000

| LOCATION | EXISTING LANES | EXISTING ROW FT | PROPOSED LANES | PROPOSED ROW FT | ADDED LANES | ADDED ROW FT | NEW MEDIAN NO = 0 YES = 1 | IMPROVED LENGTH IN MILES | ROW UNIT COST | COST OF ROW $MILLION | COST OF LANES $MILLION | COST OF MEDIAN $MILLION | COST OF UPGRADE $MILLION | TOTAL COST $MILLION | IN EVCSP? YES = 1 | EVCSP COST $MILLION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PIONEER | | | | | | | | | | | | | | | | |
| California – Alabama | 2 | 66 | 2 | 66 | 0 | 0 | 0 | 1.00 | | 0.00 | 0.00 | 0.00 | 0.50 | 0.50 | 1 | 0.50 |
| Alabama – Tennessee | 2 | 50 | 2 | 66 | 0 | 16 | 0 | 0.50 | 2 | 0.08 | 0.00 | 0.00 | 0.25 | 0.33 | 1 | 0.33 |
| Tennessee – Texas | 2 | 60 | 2 | 66 | 0 | 6 | 0 | 0.50 | 2 | 0.03 | 0.00 | 0.00 | 0.25 | 0.28 | 1 | 0.28 |
| Texas – Wabash | 2 | 60 | 2 | 60 | 0 | 0 | 0 | 3.00 | | 0.00 | 0.00 | 0.00 | 1.50 | 1.50 | | 0.00 |
| PALMETTO/DOMESTIC | | | | | | | | | | | | | | | | |
| Lugonia – California | 0 | 0 | 4 | 104 | 4 | 104 | 0 | 1.25 | 2 | 1.37 | 2.50 | 0.00 | | 3.87 | 1 | 3.87 |
| California – Alabama | 2 | 70 | 4 | 104 | 2 | 34 | 1 | 1.00 | 2 | 0.36 | 1.00 | 0.50 | | 1.86 | 1 | 1.86 |
| Alabama – Texas | 2 | 60 | 2 | 66 | 0 | 6 | 0 | 1.00 | 2 | 0.06 | 0.00 | 0.00 | 0.50 | 0.56 | 1 | 0.56 |
| SAN BERNARDINO AVE. | | | | | | | | | | | | | | | | |
| Mtn View – Alabama | 2 | 80 | 6 | 120 | 4 | 40 | 1 | 2.00 | 2 | 0.84 | 4.00 | 1.00 | | 5.84 | 1 | 5.84 |
| Alabama – Texas | 2 | 75 | 6 | 120 | 4 | 45 | 1 | 1.00 | 2 | 0.48 | 2.00 | 0.50 | | 2.98 | 1 | 2.98 |
| Texas – Orange | 2 | 80 | 6 | 120 | 4 | 40 | 1 | 0.50 | 10 | 1.06 | 1.00 | 0.25 | | 2.31 | | 0.00 |
| Orange – Judson | 2 | 80 | 4 | 96 | 2 | 16 | 0 | 1.50 | 15 | 1.90 | 1.50 | 0.00 | | 3.40 | | 0.00 |
| Judson – Wabash (50%) | 2 | 85 | 4 | 96 | 2 | 11 | 0 | 1.00 | 2 | 0.12 | 1.00 | 0.00 | | 1.12 | | 0.00 |
| Wabash – Millcreek | 0 | 0 | 4 | 96 | 4 | 96 | 0 | 2.50 | 2 | 2.53 | 5.00 | 0.00 | | 7.53 | | 0.00 |
| LUGONIA/MENTONE/MILL CREEK | | | | | | | | | | | | | | | | |
| Mtn View – Bynn Mawr | 0 | 0 | 4 | 104 | 4 | 104 | 1 | 0.50 | 2 | 0.55 | 1.00 | 0.25 | | 1.80 | 1 | 1.80 |
| Bynn Mawr – Karon | 2 | 70 | 4 | 104 | 2 | 34 | 1 | 2.25 | 2 | 0.81 | 2.25 | 1.13 | | 4.18 | 1 | 4.18 |
| Karon – Judson | 4 | 80 | 4 | 80 | 0 | 0 | 0 | 2.25 | | 0.00 | 0.00 | 0.00 | | 0.00 | | 0.00 |
| Judson – Wabash | 4 | 80 | 4 | 80 | 0 | 0 | 0 | 0.50 | | 0.00 | 0.00 | 0.00 | 0.25 | 0.25 | | 0.00 |
| Wabash – Crafton | 2 | 80 | 4 | 96 | 2 | 16 | 0 | 1.00 | 15 | 1.27 | 1.00 | 0.00 | | 2.27 | | 0.00 |
| Crafton – Garnet | 2 | 80 | 4 | 96 | 2 | 16 | 0 | 1.30 | 10 | 1.10 | 1.30 | 0.00 | | 2.40 | | 0.00 |
| Garnet – Bryant | 2 | 55 | 4 | 104 | 2 | 49 | 0 | 3.00 | 2 | 1.55 | 3.00 | 0.00 | | 4.55 | | 0.00 |
| REDLANDS BLVD. | | | | | | | | | | | | | | | | |
| California – Alabama | 4 | 75 | 6 | 120 | 2 | 45 | | 1.00 | 15 | 3.56 | 1.00 | 0.00 | | 4.56 | 1 | 4.56 |
| Alabama – Colton | 4 | 90 | 8 | 120 | 4 | 30 | | 0.15 | 15 | 0.36 | 0.30 | 0.00 | | 0.66 | 1 | 0.66 |
| Colton – Texas | 4 | 100 | 4 | 100 | 0 | 0 | | 1.25 | | 0.00 | 0.00 | 0.00 | | 0.00 | 1 | 0.00 |
| Texas – Orange | 4 | 100 | 4 | 100 | 0 | 0 | 0 | 0.50 | | 0.00 | 0.00 | 0.00 | | 0.00 | | 0.00 |
| Orange – Central | 4 | 110 | 4 | 110 | 0 | 0 | 1 | 0.25 | | 0.00 | 0.00 | 0.13 | | 0.13 | | 0.00 |
| Central – Fern | 4 | 80 | 4 | 80 | 0 | 0 | 1 | 1.25 | | 0.00 | 0.00 | 0.63 | | 0.63 | | 0.00 |
| Fern – Highland | 4 | 140 | 4 | 140 | 0 | 0 | 1 | 0.75 | | 0.00 | 0.00 | 0.38 | | 0.38 | | 0.00 |
| Highland – I-10 Fwy | 4 | 130 | 4 | 130 | 0 | 0 | 0 | 0.70 | | 0.00 | 0.00 | 0.00 | | 0.00 | | 0.00 |
| COLTON AVE. | | | | | | | | | | | | | | | | |
| Redlands – New York | 4 | 90 | 4 | 96 | 0 | 6 | 0 | 0.75 | 15 | 0.36 | 0.00 | 0.00 | 0.38 | 0.73 | 1 | 0.73 |
| New York – Orange | 2 | 90 | 4 | 96 | 2 | 6 | 0 | 0.75 | 15 | 0.36 | 0.75 | 0.00 | | 1.11 | | 0.00 |
| Orange – Church | 2 | 70 | 2 | 70 | 0 | 0 | 0 | 0.50 | | 0.00 | 0.00 | 0.00 | | 0.00 | | 0.00 |
| Church – Dearborn | 2 | 85 | 2 | 85 | 0 | 0 | 0 | 1.50 | | 0.00 | 0.00 | 0.00 | | 0.00 | | 0.00 |
| Dearborn – Wabash | 2 | 80 | 2 | 80 | 0 | 0 | 0 | 0.50 | | 0.00 | 0.00 | 0.00 | | 0.00 | | 0.00 |
| Wabash – Crafton | 2 | 72 | 2 | 72 | 0 | 0 | 0 | 1.00 | | 0.00 | 0.00 | 0.00 | 0.50 | 0.50 | | 0.00 |
| BARTON/BROOKSIDE/CITRUS | | | | | | | | | | | | | | | | |
| San Timoteo – Alabama | 4 | 100 | 4 | 100 | 0 | 0 | 1 | 1.00 | | 0.00 | 0.00 | 0.50 | | 0.50 | | 0.00 |
| Alabama – Center | 4 | 100 | 4 | 100 | 0 | 0 | 1 | 1.80 | | 0.00 | 0.00 | 0.90 | | 0.90 | | 0.00 |
| Center – Orange | 4 | 70 | 4 | 70 | 0 | 0 | 1 | 0.50 | | 0.00 | 0.00 | 0.25 | | 0.25 | | 0.00 |
| Orange – I-10 Fwy | 4 | 70 | 4 | 70 | 0 | 0 | 0 | 1.00 | | 0.00 | 0.00 | 0.00 | | 0.00 | | 0.00 |
| I-10 Fwy – Judson | 4 | 80 | 4 | 80 | 0 | 0 | 0 | 0.50 | | 0.00 | 0.00 | 0.00 | | 0.00 | | 0.00 |
| Judson – Wabash | 2 | 65 | 4 | 96 | 2 | 31 | 0 | 1.00 | 2 | 0.33 | 1.00 | 0.00 | | 1.33 | | 0.00 |
| Wabash – Crafton | 2 | 70 | 2 | 70 | 0 | 0 | 0 | 1.00 | | 0.00 | 0.00 | 0.00 | 0.50 | 0.50 | | 0.00 |
| CYPRESS AVE. | | | | | | | | | | | | | | | | |
| Terracino – Redlands | 4 | 100 | 4 | 100 | 0 | 0 | 0 | 1.00 | | 0.00 | 0.00 | 0.00 | | 0.00 | | 0.00 |
| Redlands – Citrus (50%) | 2 | 100 | 4 | 100 | 2 | 0 | 0 | 0.50 | | 0.00 | 0.50 | 0.00 | | 0.50 | | 0.00 |
| HIGHLAND AVE./FIFTH | | | | | | | | | | | | | | | | |
| San Mateo – Ford | 2 | 100 | 2 | 100 | 0 | 0 | 0 | 2.10 | | 0.00 | 0.00 | 0.00 | | 0.00 | | 0.00 |
| Ford – Wabash | 2 | 75 | 2 | 75 | 0 | 0 | 0 | 1.00 | | 0.00 | 0.00 | 0.00 | 0.50 | 0.50 | | 0.00 |
| Wabash – Crafton | 2 | 70 | 2 | 70 | 0 | 0 | 0 | 1.00 | | 0.00 | 0.00 | 0.00 | 0.50 | 0.50 | | 0.00 |
| MOUNTAIN VIEW | | | | | | | | | | | | | | | | |
| I-10 Fwy – San Bernardino | 2 | 100 | 6 | 120 | 4 | 20 | 1 | 0.75 | 2 | 0.16 | 1.50 | 0.38 | | 2.03 | 1 | 2.03 |
| | | | | | | | | | | | | | | 0.00 | | 0.00 |
| CALIFORNIA ST. | | | | | | | | | | | | | | | | |
| Palmetto – San Bernardino | 0 | 0 | 6 | 120 | 6 | 120 | 1 | 0.50 | 2 | 0.63 | 1.50 | 0.25 | | 2.38 | 1 | 2.38 |

## REDLANDS GENERAL PLAN -- COST OF IMPROVEMENTS

ASSUME COST OF WIDENING (PER LANE-MILE) = $500,000
ASSUME COST OF UPGRADING OR MEDIAN (PER MILE) = $500,000

| LOCATION | EXISTING LANES | EXISTING ROW FT | PROPOSED LANES | PROPOSED ROW FT | ADDED LANES | ADDED ROW FT | NEW MEDIAN NO = 0 YES = 1 | IMPROVED LENGTH IN MILES | ROW UNIT COST | COST OF ROW $MILLION | COST OF LANES $MILLION | COST OF MEDIAN $MILLION | COST OF UPGRADE $MILLION | TOTAL COST $MILLION | IN EVCSP? YES = 1 | EVCSP COST $MILLION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. Bernardino – I-10 Fwy | 2 | 80 | 6 | 120 | 4 | 40 | 1 | 0.75 | 2 | 0.32 | 1.50 | 0.38 | | 2.19 | 1 | 2.19 |
| I-10 Fwy – Barton | 2 | 75 | 6 | 120 | 4 | 45 | 1 | 1.25 | 2 | 0.59 | 2.50 | 0.63 | | 3.72 | 1 | 3.72 |
| NEVADA ST. | | | | | | | | | | | | | | | | |
| San Bernardino – I-10 Fwy | 2 | 65 | 4 | 96 | 2 | 31 | 0 | 0.75 | 2 | 0.25 | 0.75 | 0.00 | | 1.00 | 1 | 1.00 |
| I-10 Fwy – Brookside | 2 | 60 | 4 | 96 | 2 | 36 | 0 | 1.25 | 2 | 0.48 | 1.25 | 0.00 | | 1.73 | 1 | 1.73 |
| ALABAMA ST. | | | | | | | | | | | | | | | | |
| North of S.Bernardino | 4 | 90 | 6 | 120 | 2 | 30 | 1 | 1.50 | 2 | 0.48 | 1.50 | 0.75 | | 2.73 | 1 | 2.73 |
| S. Bernardino – I-10 Fwy | 4 | 90 | 6 | 120 | 2 | 30 | 1 | 0.75 | 2 | 0.24 | 0.75 | 0.38 | | 1.36 | 1 | 1.36 |
| I-10 Fwy – Redlands | 4 | 90 | 6 | 120 | 2 | 30 | 1 | 0.25 | 2 | 0.08 | 0.25 | 0.13 | | 0.45 | 1 | 0.45 |
| Redlands – Barton | 4 | 90 | 6 | 120 | 2 | 30 | 1 | 1.00 | 2 | 0.32 | 1.00 | 0.50 | | 1.82 | 1 | 1.82 |
| TENNESSEE/SAN MATEO | | | | | | | | | | | | | | | | |
| S.Bernardino – Lugonia | 0 | 0 | 6 | 120 | 6 | 120 | 1 | 0.50 | 10 | 3.17 | 1.50 | 0.25 | | 4.92 | 1 | 4.92 |
| I-10 Fwy – Park | 4 | 90 | 4 | 90 | 0 | 0 | 0 | 0.50 | | 0.00 | 0.00 | 0.00 | | 0.00 | 1 | 0.00 |
| Park – Brookside (50%) | 4 | 85 | 4 | 85 | 0 | 0 | 0 | 0.40 | | 0.00 | 0.00 | 0.00 | 0.20 | 0.20 | | 0.00 |
| Brookside – Highland | 4 | 80 | 4 | 80 | 0 | 0 | 0 | 1.25 | | 0.00 | 0.00 | 0.00 | | 0.00 | | 0.00 |
| EUREKA | | | | | | | | | | | | | | | | |
| Colton – Citrus | 2 | 50 | 4 | 96 | 2 | 46 | 0 | 0.50 | 15 | 1.82 | 0.50 | 0.00 | | 2.32 | | 0.00 |
| TEXAS/CENTER | | | | | | | | | | | | | | | | |
| Palmetto – Pennsylvania | 2 | 80 | 4 | 96 | 2 | 16 | 0 | 0.75 | 2 | 0.13 | 0.75 | 0.00 | | 0.88 | 0.5 | 0.44 |
| Pennsylvania – Colton | 2 | 85 | 4 | 96 | 2 | 11 | 0 | 0.75 | 15 | 0.65 | 0.75 | 0.00 | | 1.40 | 0.5 | 0.70 |
| Colton – Brookside (50%) | 2 | 90 | 4 | 90 | 2 | 0 | 0 | 0.40 | | 0.00 | 0.40 | 0.00 | | 0.40 | | 0.00 |
| Brookside – Highland | 2 | 90 | 2 | 90 | 0 | 0 | 0 | 1.25 | | 0.00 | 0.00 | 0.00 | | 0.00 | | 0.00 |
| ORANGE ST./CAJON | | | | | | | | | | | | | | | | |
| North of S.Bernardino | 2 | 70 | 2 | 70 | 0 | 0 | 0 | 1.50 | | 0.00 | 0.00 | 0.00 | 0.75 | 0.75 | | 0.00 |
| S. Bernardino – I-10 Fwy | 2 | 70 | 4 | 96 | 2 | 26 | 0 | 1.00 | 15 | 2.06 | 1.00 | 0.00 | | 3.06 | | 0.00 |
| I-10 Fwy – Citrus | 4 | 80 | 4 | 80 | 0 | 0 | 0 | 0.50 | | 0.00 | 0.00 | 0.00 | | 0.00 | | 0.00 |
| Citrus – Cypress | 2 | 85 | 2 | 85 | 0 | 0 | 0 | 0.75 | | 0.00 | 0.00 | 0.00 | | 0.00 | | 0.00 |
| Cypress – Highland | 2 | 90 | 2 | 90 | 0 | 0 | 0 | 0.50 | | 0.00 | 0.00 | 0.00 | | 0.00 | | 0.00 |
| CHURCH ST. | | | | | | | | | | | | | | | | |
| N/S. Bernardino – Colton | 2 | 70 | 2 | 70 | 0 | 0 | 0 | 1.00 | | 0.00 | 0.00 | 0.00 | | 0.00 | | 0.00 |
| Colton – Redlands | 2 | 70 | 2 | 70 | 0 | 0 | 0 | 0.70 | | 0.00 | 0.00 | 0.00 | | 0.00 | | 0.00 |
| UNIVERSITY ST. | | | | | | | | | | | | | | | | |
| S. Bernardino – Lugonia | 2 | 60 | 2 | 60 | 0 | 0 | 0 | 0.50 | | 0.00 | 0.00 | 0.00 | | 0.00 | | 0.00 |
| Lugonia – Colton | 2 | 60 | 2 | 60 | 0 | 0 | 0 | 0.50 | | 0.00 | 0.00 | 0.00 | | 0.00 | | 0.00 |
| Colton – Cypress | 4 | 60 | 4 | 60 | 0 | 0 | 0 | 0.75 | | 0.00 | 0.00 | 0.00 | | 0.00 | | 0.00 |
| JUDSON ST./FORD ST. | | | | | | | | | | | | | | | | |
| N/Pioneer – Colton | 2 | 70 | 2 | 70 | 0 | 0 | 0 | 1.25 | | 0.00 | 0.00 | 0.00 | 0.63 | 0.63 | | 0.00 |
| Colton – Redlands | 2 | 75 | 2 | 75 | 0 | 0 | 0 | 1.50 | | 0.00 | 0.00 | 0.00 | | 0.00 | | 0.00 |
| DEARBORN | | | | | | | | | | | | | | | | |
| N/Pioneer – Lugonia | 0 | 85 | 2 | 85 | 2 | 0 | 0 | 1.00 | | 0.00 | 1.00 | 0.00 | | 1.00 | | 0.00 |
| Lugonia – 5th | 2 | 65 | 2 | 65 | 0 | 0 | 0 | 1.50 | | 0.00 | 0.00 | 0.00 | | 0.00 | | 0.00 |
| | | | | | | | | | | | | | | | | 0.00 |
| WABASH AVE. | | | | | | | | | | | | | | | | |
| Pioneer – S. Bernardino | 2 | 50 | 2 | 50 | 0 | 0 | 0 | 0.40 | | 0.00 | 0.00 | 0.00 | 0.20 | 0.20 | | |
| S. Bernardino – Lugonia | 2 | 55 | 2 | 72 | 0 | 17 | 0 | 0.50 | 10 | 0.45 | 0.00 | 0.00 | 0.25 | 0.70 | | 0.00 |
| Lugonia – Colton | 2 | 85 | 2 | 85 | 0 | 0 | 0 | 0.50 | | 0.00 | 0.00 | 0.00 | 0.25 | 0.25 | | 0.00 |
| Colton – I-10 Fwy (50%) | 2 | 60 | 2 | 72 | 0 | 12 | 0 | 1.25 | 10 | 0.79 | 0.00 | 0.00 | 0.63 | 1.42 | | 0.00 |
| GRAFTON/SAND CANYON | | | | | | | | | | | | | | | | |
| S. Bernardino – 5th | 2 | 72 | 2 | 72 | 0 | 0 | 0 | 2.00 | | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | | 0.00 |
| 5th – Limits | 4 | 96 | 4 | 96 | 0 | 0 | 0 | 1.00 | | 0.00 | 0.00 | 0.00 | | 0.00 | | 0.00 |
| SAN TIMOTEO CYN. ROAD | | | | | | | | | | | | | | | | |
| Barton – Fern | 0 | 0 | 4 | 96 | 4 | 96 | 0 | 1.70 | 2 | 1.72 | 3.40 | 0.00 | | 5.12 | | 0.00 |
| Fern – Allesandro | 2 | 50 | 4 | 96 | 2 | 46 | 0 | 2.00 | 2 | 0.97 | 2.00 | 0.00 | | 2.97 | | 0.00 |
| Allesandro – Live Oaks | 2 | 100 | 4 | 100 | 2 | 0 | 0 | 1.25 | | 0.00 | 1.25 | 0.00 | | 1.25 | | 0.00 |

# Redlands General Plan Update
# Air Quality Technical Background Study

Endo Engineering

August 1, 1995

*Endo Engineering* *Traffic Engineering* *Air Quality Studies* *Noise Assessments*

August 1, 1995

Mr. Paul DePalatis
Smith Peroni & Fox
960 Tahquitz Canyon Way - Suite 103
Palm Springs, CA 92262

***SUBJECT: City of Redlands General Plan Update and EIR***
***Air Quality Technical Background Study***

Dear Mr. DePalatis;

Endo Engineering is pleased to submit this technical background report addressing existing and future air quality throughout the City of Redlands for your use in preparing a General Plan update. The data provided herein will establish a foundation for the assessment of future air quality impacts on the community and the development of planning and development strategies to minimize the potential for adverse impacts. The pages which follow document: (1) fundamentals of air pollution; (2) local and regional air quality; (3) the regulatory setting; (4) air quality planning programs; (5) an alternative impact assessment; and (5) mitigation measures that could help reduce future air quality impacts to the maximum extent feasible.

We trust that the information provided herein will be of immediate and continuing value to the City of Redlands. It is sufficiently detailed to be used in the preparation of the Master Environmental Assessment and the Environmental Impact Report for the General Plan update. Should questions or comments develop regarding the findings and recommendations within this report, please do not hesitate to contact our offices at (714) 768-4333.

Cordially,

ENDO ENGINEERING

Vicki Lee Endo

Vicki Lee Endo
Registered Professional
Traffic Engineer TR 1161

REGISTERED PROFESSIONAL ENGINEER
VICKI LEE ENDO
TR 1161
12/31/98
TRAFFIC
STATE OF CALIFORNIA

*95 Argonaut - Suite 115, Aliso Viejo, California 92656-1487*
*(714) 768-4333 FAX (714) 768-0718*

## Table of Contents


| Section | Title | Page |
|---|---|---|
| 1.0 | **INTRODUCTION** | 1-1 |
| 2.0 | **EXISTING AIR QUALITY** | 2-1 |
| | - Air Pollution Fundamentals<br>- Regional Air Quality<br>- Local Air Quality<br>- Regulatory Setting | |
| 3.0 | **AIR QUALITY IMPACT ANALYSIS** | 3-1 |
| | - Short-Term Construction-Related Impacts<br>- Long-Term Operational Impacts<br>- Alternative Impact Assessment<br>- Relevant Planning Programs<br>- Cumulative and Growth Inducing Effects | |
| 4.0 | **AIR QUALITY MITIGATION MEASURES** | 4-1 |
| | **APPENDIX** | |
| | - Ambient Air Quality Standards<br>- Episode Criteria<br>- Ambient Air Quality Data<br>- CALINE 4 Assumptions and Results<br>- Field Office Stationary Source Emissions Worksheet<br>- Construction Period Equipment Emissions Worksheet<br>- Fugitive Dust Threshold Guidelines Worksheet<br>- SCAQMD Rule 403<br>- Energy Consumption Worksheets<br>- Stationary Source Emissions Worksheet<br>- Mobile Source Emissions Worksheets | |

# 1.0 INTRODUCTION

Air pollution is a major concern in southern California because of public health effects and property damage caused by air contaminants. It is also a regional problem which does not respect jurisdictional boundaries. The City of Redlands has recognized its place as both a generator and receptor of regional air pollution. The General Plan is intended to protect the health and welfare of the community by promoting development which is conducive to the attainment of state and federal ambient air quality standards.

State and federal legislation mandating regional plans to restore air quality to healthful levels has resulted from concerns over air pollutant problems. Both the Southern California Association of Governments (SCAG) and the South Coast Air Quality Management District (SCAQMD) are responsible for preparing an Air Quality Management Plan (AQMP) for the South Coast Air Basin (SCAB) and portions of the South East Desert Air Basin (SEDAB). The City of Redlands is located within the SCAB.

## 1.1 Purpose and Scope

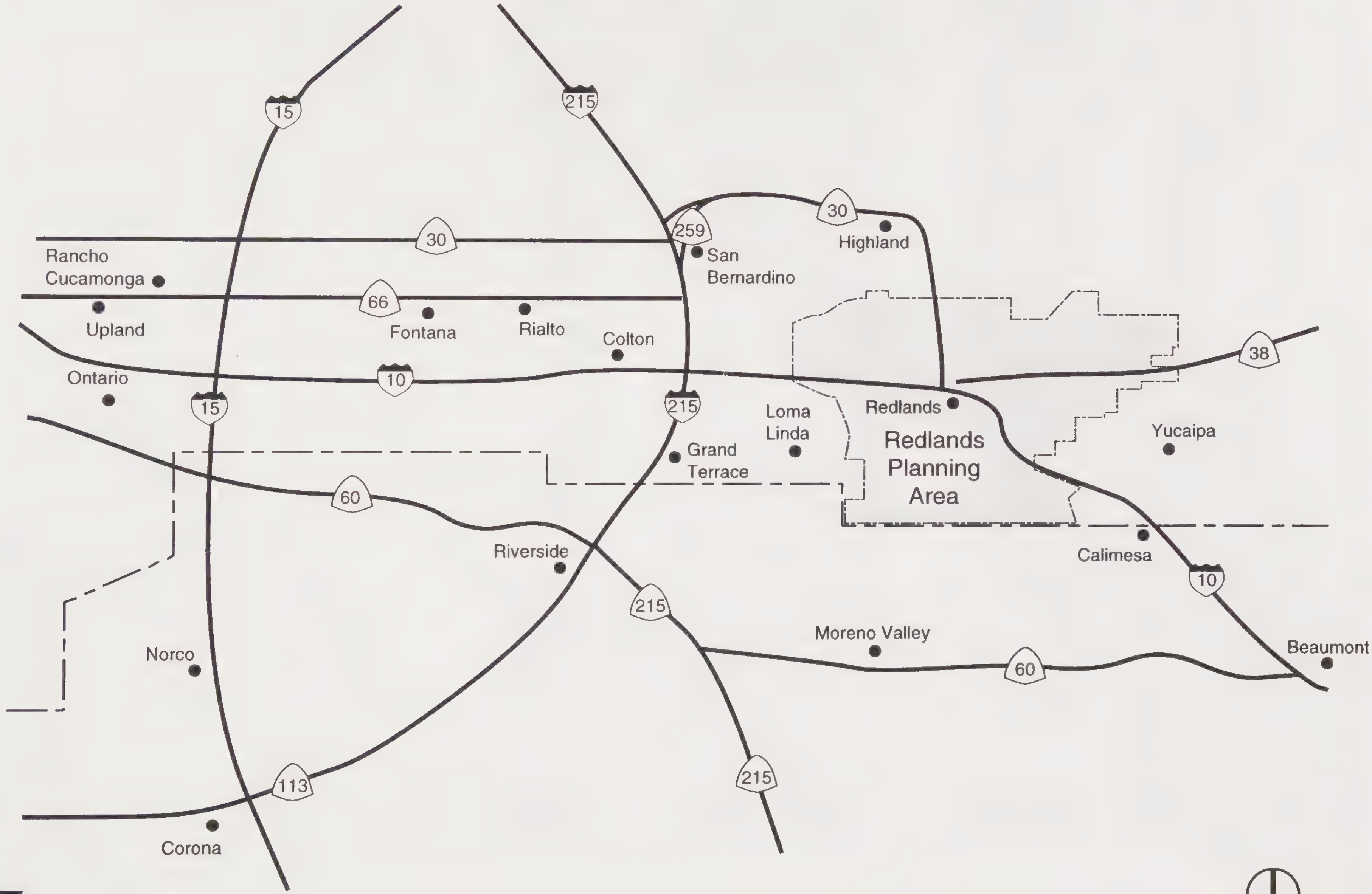
This report documents the air quality technical background study developed to support the preparation of the Redlands General Plan update, Master Environmental Assessment (MEA) and Environmental Impact Report (EIR). It evaluates the current and future air quality in the planning area and was designed to fulfill state and local environmental requirements related to air quality. It addresses: fundamentals of air pollution, regional and local air quality, the regulatory setting, relevant planning programs, short-term and long-term impacts, impacts of alternatives, cumulative and growth inducing effects, and potential mitigation measures that could reduce future impacts of development to the maximum extent feasible.

## 1.2 Project Location

In 1994, the City of Redlands had a population of 66,301 and an area of approximately 36 square miles. It is located in the eastern San Bernardino Valley, east of Interstate 215 and on either side of Interstate 10. Figure 1-1 is a Regional Location Map that illustrates the City of Redlands in its regional context.

Figure 1-1

Regional Location




Endo Engineering

Scale: 1" = 4.2 Miles

## 2.0 EXISTING AIR QUALITY

### 2.1 Air Pollution Fundamentals

Air pollution is comprised of many substances generated from a variety of sources, both man-made and natural. Since the rapid industrialization of the twentieth century, almost every human endeavor, especially those relying on the burning of fossil fuels, creates air pollution. Most contaminants are actually wasted energy in the form of unburned fuels or by-products of the combustion process.

Motor vehicles are by far the most significant source of air pollutants in urban areas, emitting photochemically reactive hydrocarbons (unburned fuel), carbon monoxide, and oxides of nitrogen. These primary pollutants chemically react in the atmosphere with sunlight and the passage of time to form secondary pollutants such as ozone.

Although significant air quality improvements have been made in California over the past twenty years, Southern California still experiences severe air pollution problems. Oxidants and $PM_{10}$ (suspended particulate matter with a mean aerodynamic diameter of less than 10 micrometers) represent the major air quality problems basin-wide. As shown in Figure 2-1, the City of Redlands is located within the South Coast Air Basin, which is under the jurisdiction of the South Coast Air Quality Management District.

The SCAB is comprised of 6,530 square miles located in four counties bounded by the Pacific Ocean to the west and the San Gabriel, San Bernadino, and San Jacinto Mountains to the north and east. It includes all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernadino Counties. On-road vehicles currently number approximately 10 million in the SCAB. These vehicles traveled more than 300 million miles per day in 1994.[1]

The air quality of the South Coast Air Basin is determined by the primary pollutant emissions added daily, and by the primary and secondary pollutants already present in the air mass. Primary pollutants are those emitted directly from a source and include: carbon monoxide (CO), nitric oxide (NO), sulfur dioxide ($SO_2$), particulates, and various hydrocarbons and other volatile organic compounds (VOCs). Secondary pollutants are created with the passage of time in the air mass and include: photochemical oxidants (90% of which are ozone), photochemical aerosols, peroxyacetylnitrate, and nitrogen dioxide ($NO_2$).

### Criteria Air Pollutants

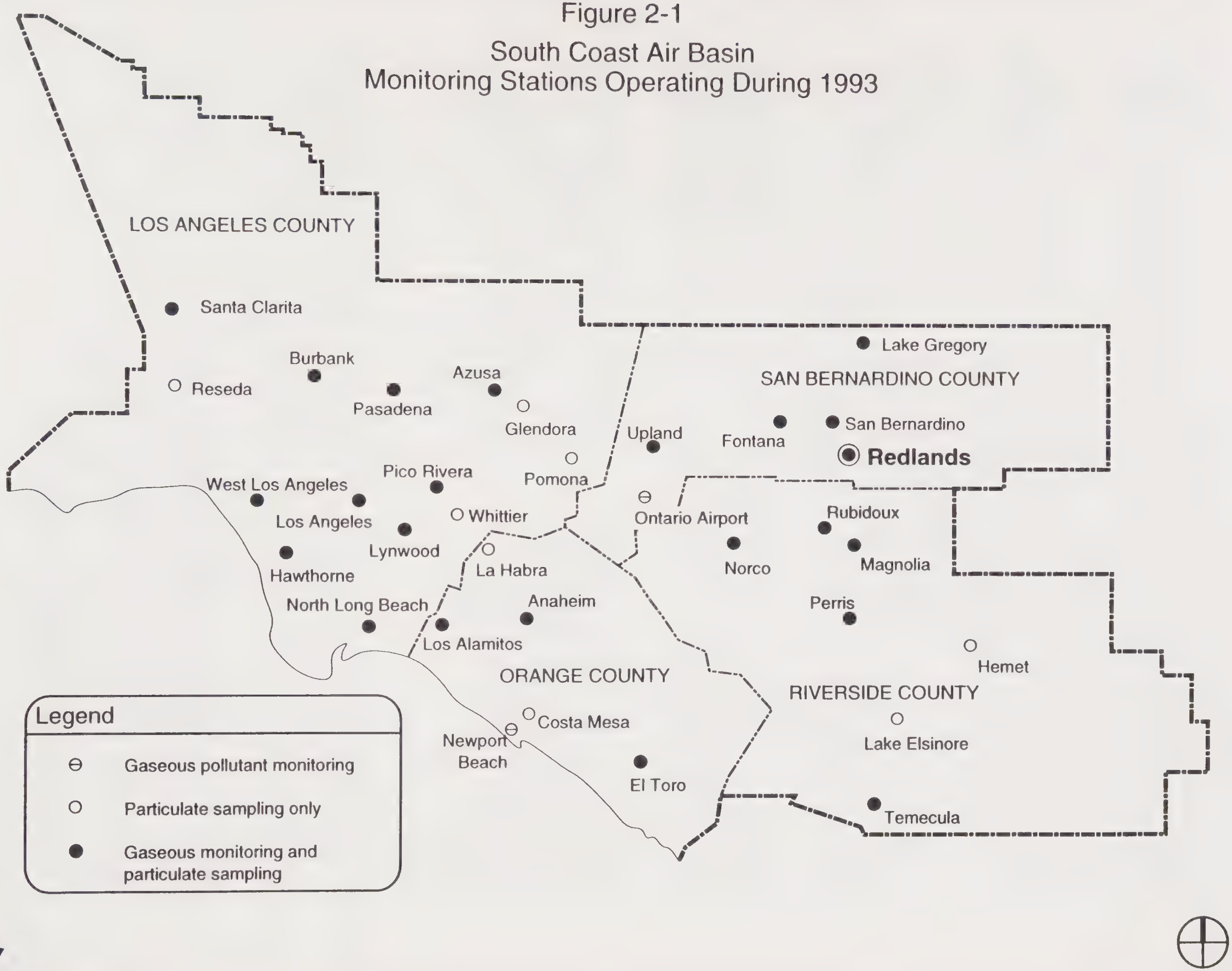
Photochemical oxidant ($O_3$) can include several different pollutants, but consists primarily of ozone (90%) and a group of chemicals called organic peroxynitrates. Ozone is a pungent, colorless toxic gas which is produced by the photochemical process. Photochemical oxidant is created by complex atmospheric reactions involving oxides of nitrogen and volatile organic compounds, in the presence of ultraviolet energy from sunlight.

Motor vehicles are the major source of oxides of nitrogen and volatile organic compounds in the air basin. Conditions throughout the basin are ideal for photochemical smog formation because of the area's dependence on the automobile. Vehicles on area roadways result in hydrocarbon and oxides of nitrogen emissions that can be trapped by prevailing atmospheric inversions and exposed to sunshine.

---

1. Source: SCAQMD; *1994 AQMP*; April 1994; pg. 4-14.

Figure 2-1
South Coast Air Basin
Monitoring Stations Operating During 1993




Endo Engineering

Source: CARB "California Air Quality Data", Annual Summary 1993.

Scale: 1" = 15.5 Miles

Photochemical oxidant, characteristic of southern California smog, reaches its highest concentrations during the summer and early fall. During winter, early morning low clouds and fog prevail in urbanized coastal areas reducing the amount of ultraviolet energy and thereby reducing the production of photochemical oxidants and the exposure of downwind receptor areas to high ozone concentrations.

Ozone is formed through chemical reactions of VOCs, oxides of nitrogen and oxygen in the presence of sunlight. Peak ozone concentrations tend to occur in the South Coast Air Basin near the middle of the day in summer and early fall, when the solar radiation exposure of the air mass is the greatest, because the reactions that form ozone begin at sunrise and require sunlight to proceed.

The observed ozone concentration at a specific location is affected by the following parameters:

- the concentrations of ozone precursors (NOx and VOC);
- the ratio of precursor concentrations (amount of VOC versus NOx present, with NOx being the critical component);
- the spatial and temporal distribution of emissions; and
- meterological conditions (hot weather with lots of sunlight and strong temperature inversions).

Particulate matter consists of particles in the atmosphere as a by-product of fuel combustion, through abrasion such as tire wear, and through soil erosion by the wind. Particulates can also be formed through photochemical reactions in the atmosphere. $PM_{10}$ refers to finely divided solids or liquids such as soot, dust, and aerosols which are 10 microns or less in diameter and can enter the lungs.

About 90% of the total particulates are less than 5 microns in diameter, while the aerosols formed in the atmosphere (primarily sulfate and nitrate) are usually smaller than 1 micron. Particulate concentrations are generally higher in the winter near major sources, when more fuel is burned and meteorological conditions favor the build-up of directly-emitted contaminants.

Carbon monoxide is a colorless, odorless, toxic gas formed by incomplete combustion of fossil fuels. Carbon monoxide concentrations are generally higher in the winter, when meteorological conditions favor the build-up of directly emitted contaminants. Carbon monoxide health warnings and emergency episodes occur almost entirely during the winter. The most significant source of carbon monoxide is gasoline powered automobiles, as a result of inefficient fuel usage in internal combustion engines. Various industrial processes also emit carbon monoxide.

Oxides of nitrogen (NOx) are primary receptors of ultraviolet light initiating the photochemical reactions that produce smog. Nitric oxide combines with oxygen in the presence of reactive hydrocarbons and sunlight to form nitrogen dioxide and ozone. Oxides of nitrogen are contributors to other air pollution problems including: high levels of fine particulate matter, poor visibility and acid deposition.

Seven oxides of nitrogen and two hydrated oxides can theoretically exist in the atmosphere, but only four are present in noticeable amounts. Two of these are classified as pollutants. These are nitric oxide, a colorless, odorless gas and nitrogen dioxide, a reddish-brown gas formed by the combination of nitric oxide with oxygen. Nitric oxide is far less toxic than nitrogen dioxide in humans.

The primary sources of nitrogen oxides in the basin are incomplete combustion in motor vehicle engines, power plants, refineries and other industrial operations. Ships, railroads and aircraft are other significant emission sources.

Sulfur dioxide results from the combustion of high sulfur content fuels. Fuel combustion is the major source of $SO_2$, while chemical plants, sulfur recovery plants, and metal processing are minor contributors. Sulfates result from a reaction of sulfur dioxide and oxygen in the presence of sunlight. $SO_2$ levels are generally higher in the winter than in the summer (when sunlight is plentiful and sulfate is formed more readily).

Recent reductions in sulfur dioxide levels reflect the use of natural gas in power plants and boilers (since natural gas is very low in sulfur). Low sulfur fuel oil is also utilized within this air basin.

Hydrocarbon and other volatile organic compounds are formed from combustion of fuels and the evaporation of organic solvents. Many hydrocarbon compounds are major air pollutants, and those classified as aromatics are highly photochemically reactive with $NO_x$, forming photochemical smog. Hydrocarbon concentrations are generally higher in winter when sunlight is limited and photochemical reactions occur more slowly. During the winter, meteorological conditions are more favorable to their accumulating in the atmosphere before producing photochemical oxidants. Motor vehicles are the major source of organic gases in this basin.

### Ambient Air Quality Standards

Ambient air quality is determined from data collected at air quality monitoring stations located throughout the air basin. The ambient air quality data is given in terms of state and federal standards (as shown in the Appendix). These standards represent air pollutant concentrations which are considered safe (with a reasonable margin of safety) to protect the public health and welfare.

Both California and the federal government have set air quality standards for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, $PM_{10}$ and lead. The state and federal ambient air quality standards are detailed in the Appendix. The California standards are more stringent than the federal standards (particularly with regard to $PM_{10}$ and sulfur dioxide). California has also set standards for sulfate, visibility, hydrogen sulfide, and vinyl chloride.

Two types of national standards have been established. Primary standards that were designed to safeguard the health of people considered to be sensitive receptors while outdoors were adopted. Secondary standards designed to safeguard human welfare (by minimizing damage to plants, and the oxidation of rubber and paint etc.) were also established by the federal government.

Ambient air quality standards are designed to protect that segment of the population that is most susceptible to respiratory distress or infection such as: asthmatics, the very young, the elderly, people weak with illness or disease, or persons engaged in heavy work or exercise (i.e. sensitive receptors). Healthy adults can tolerate periodic exposures to air pollutant levels well above these standards before adverse health effects are observed.

California has adopted health advisory levels called episode criteria for ozone, carbon monoxide, sulfur dioxide, and ozone in combination with sulfates. Episode criteria

represent short-term exposures at concentrations which actually threaten public health (refer to the Appendix for additional details).

*Episode Criteria*

The most effective means of mitigating adverse impacts associated with high pollution levels is to limit the amount of pollution generated and the activity of sensitive receptors during periods when pollutant concentrations are high. Currently, the South Coast Air Quality Management District monitors contaminant levels and meteorological factors on a daily basis in order to forecast high pollutant levels in stable atmospheric conditions. Such conditions are known as "episodes". Criteria for episodes are available for photochemical oxidants, carbon monoxide, sulfur dioxide, nitrogen dioxide, particulate matter and combinations of sulfur dioxide and particulate matter (as shown in the Appendix). Episodes are divided into three stages depending upon the concentration of the pollutant that is predicted or reached.

"Good" air quality is predicted when ozone levels are predicted to remain at or below .06 ppm for one hour. "Moderate" air quality if forecast when ozone levels will meet the federal clean air atandard but are predicted to be between .07 and .12 ppm. "Unhealthful" air quality is forecast when 1-hour ozone levels reach or are predicted to reach .13 or .14 ppm. This ozone level exceeds federal standards and indicates that susceptible persons should minimize outdoor activities.

An ozone health advisory is issued when 1-hour ozone levels are predicted to be between .15 ppm and .19 ppm. The issuance of an ozone health advisory indicates that susceptible persons should avoid outdoor activity and all others should avoid prolonged vigorous outdoor exercise.

"Very Unhealthful" air quality is predicted when the Stage I ozone episode levels are reached or predicted to occur (0.20 ppm for one hour). Everyone should avoid vigorous outdoor exercise when "Very Unhealthful" air quality is predicted.

"Hazardous" air quality is predicted when Stage II ozone episode levels are forecast or reached (0.35 ppm for one hour). Everyone should avoid outdoor activities and susceptible people should stay indoors when hazardous air quality is predicted.

*Stage 1 Episode (Health Advisory)*

A health advisory is issued when the Stage I concentration of any pollutant is either predicted or reached. People with respiratory or coronary disease are notified through mass media to take precautions against exposure and exertion. Schools are notified through established channels so that student participation in strenuous activities is limited. Abatement actions for this stage are mainly voluntary, except for open burning of combustible refuse and the implementation of first stage-episode plans by specified industry, business and government agencies.

*Stage 2 Episode (Warning)*

A warning must be called when Stage 2 concentrations of any pollutant are predicted or reached. Since this is an intermediate stage, abatement action to reduce emissions of the pollutant of concern can range from voluntary reduction in vehicle operations and further industrial curtailment to the mandatory prohibition of incinerator use.

*Stage 3 Episode (Emergency)*

An emergency must be called when Stage 3 pollutant levels are predicted or reached. If local abatement efforts during a Stage 3 Episode are inadequate, the State of California can take action under the appropriate provisions of the State Peace-Time Emergency Plan. At this stage, vehicle use is prohibited and public activities can be stopped. Industrial operations may be shut down or curtailed. Stage III Episodes (ozone exceeding 0.50 ppm) were relatively frequent events in the 1960s but from 1986-1994 the highest hourly ozone concentration in the SCAB was 0.35 ppm.

**Effects of Pollutants on Sensitive Receptors**

The California Air Resources Board has identified the following groups of individuals as the most likely to be affected by air pollution: the elderly over 65; children under 14; athletes; and people with cardiovascular and chronic respiratory diseases such as asthma, emphysema, and bronchitis. These sensitive groups represent over 50% of the total California population.[2]

The elderly are most sensitive, since the loss of lung tissue is a natural process of aging. Inhalation of air pollution accelerates this loss by reducing lung volume, and functional lung tissue. Damaged and irritated lung tissue becomes susceptible to bacterial infection. This increases the likelihood of chronic respiratory disease by reducing the ability of the immune system to fight infection and resist disease.

Demonstrated effects of specific air contaminants on health and vegetation are briefly discussed below and summarized in Table 2-1. Oxidants at high enough concentrations can cause eye irritation; aggravate respiratory disease; suppress the body's capacity to fight infection; impair athletic performance and cause growth retardation in sensitive trees. Oxidants also cause cracking of untreated rubber. Short-term and long-term ozone exposures have been found to have adverse health effects on humans and animals.

Volatile organic compounds in the presence of other primary pollutants (particularly oxides of nitrogen) lead to the formation of oxidants. VOCs also damage plants by inhibiting growth and causing flowers and leaves to fall.

Carbon monoxide is essentially colorless, odorless and toxic to humans. It enters the blood stream and interferes with the transfer of fresh oxygen, thereby depriving sensitive tissues in the heart and brain of oxygen. At high enough concentrations it can impair visual function, psychomotor performance and time discrimination. Carbon monoxide exposure aggravates angina pectoris and other aspects of coronary heart disease. It may also impose increase risks to fetuses.

Nitrogen dioxide at high enough exposures can cause fibrotic lung changes, bronchostriction, and acute bronchitis among infants and school children. Over several months, it can cause collapsed lesions near the leaf margin and moderate injury in sensitive plants. Nitrogen dioxide aggravates chronic respiratory disease and respiratory symptoms in sensitive groups.

Suspended particulates such as soot, dust, aerosols, fumes, and mists produce haze and reduce visibility. Health concerns focus on smaller particles that penetrate deeply into and then damage the human respiratory tract. Deaths from short-term exposures have been documented and symptoms are exacerbated in sensitive patients with respiratory disease.

---

2. Source: CARB, *Facts About How Air Pollution Damages Health;* 1983.

Excess seasonal declines in pulmonary function have been found (especially in children). Typically, industrial and agricultural operations, combustion, and photochemical reactions produce suspended particulates.

Table 2-1
Health Effects of Air Pollutants[a]

| Pollutant | Concentration/ Exposure Time | Observed Health Effects at Specified Concentrations |
|---|---|---|
| Ozone | 0.25 ppm/1 hour | Increased frequency of asthma attacks. |
| | 0.30 ppm/1 hour | Cough, chest discomfort and headache. |
| | 0.37 ppm/2 hours | Decline in pulmonary function in healthy individuals. |
| Carbon Monoxide | 15-18 ppm/8 hours | Can cause decreased exercise capacity in patients with angina pectoris. |
| | 50 ppm/1 hour | Can cause impairment of time interval estimation and visual function. |
| Nitrogen Dioxide | 0.11 ppm/few minutes | Sensory responses may be elicited or altered. |
| | Daily peak exceeds 0.45 ppm on 10% of days in 12 months | May cause some impairment of pulmonary function and increased incidence of acute respiratory disease. |
| | 1.50 ppm/short term | Can cause difficulty in breathing in healthy as well as bronchitic groups. |
| Lead | 3.2 ug/m$^3$ / 7 weeks | Increase in blood lead levels which may impair or decrease hemoglobin synthesis. |
| Sulfur Dioxide/ Total Suspended Particulate (TSP) | 0.037 ppm SO annual average association with 100 ug/m$^3$ smoke[b] | May cause higher frequencies of acute respiratory symptoms and diminished ventilatory function in children. |

a. SCAQMD, *1983 Annual Summary*.
b. Smoke is a British measure of particulate matter concentration.

Lead at high enough concentrations impairs hemoglobin synthesis and nerve conduction by increasing lead levels in the blood. Sulfur dioxide and suspended particulate exposures can each cause higher frequencies of acute respiratory symptoms and diminished ventilatory function in children. In addition, these two pollutants at lower concentrations can act in conjunction to cause greater harm by injuring lung tissue. Sulfur oxides, in combinations with moisture and oxygen, can yellow the leaves of plants, dissolve marble, and erode iron and steel. Sulfates decrease ventilatory function, aggravate asthmatic symptoms, aggravate cardio-pulmonary disease and cause damage to vegetation (while degrading visibility).

## 2.2 Regional Air Quality

Southern California, with the lowest summertime mean mixing height, the lowest average wind speed and emissions from the second largest urban area in the U.S., has the worst air pollution problem in the nation. During 1992, the SCAB recorded higher concentrations of ozone, carbon monoxide, nitrogen dioxide and $PM_{10}$ than any other major urban area nationwide. In 1993, the federal standards were exceeded on 147 days, a decrease of 47 percent compared to conditions in 1976, when one or more of the federal standards were exceeded in the SCAB on 279 days. The South Coast Air Basin is currently nonattainment for ozone, carbon monoxide, fine particulate matter and nitrogen dioxide. Sulfate, sulfur dioxide, and lead concentrations were below both state and federal standards.

The 6,530-square-mile South Coast Air Basin had a 1990 population of 12,998,620 that is projected by SCAG to grow at an average rate of 1.5 percent per year to 15,223,210 by the year 2000 and 17,362,768 by the year 2010.[3] On-road motor vehicles in the SCAB currently number approximately 10 million. These vehicles traveled more than 300 million miles per day in 1994.

Despite a population increase of 84 percent between 1960 and 1990, and associated increases in industrial activity and vehicle miles traveled (VMT), air pollutant concentrations in the SCAB have been significantly reduced. Nevertheless, measured concentrations of some pollutants were still well above standards set to protect public health in 1994.

The air pollution burden of the SCAB is substantial and the topography and climate combine to make the SCAB an area of high air pollution potential. The daily emissions within the SCAB during 1990 were estimated by the California Air Resources Board to be nearly twice that of the San Francisco By Area Air Basin and more than three times that of the San Diego Air Basin.[4]

Over the past 30 years, ozone levels have been reduced by half in the SCAB and other criteria pollutant concentrations have significantly declined. The $SO_2$ and lead standards have been met in the SCAB, and for the first time in 1992, the federal annual $NO_2$ standard was not exceeded in the basin. Even with these improvements in air quality, the SCAB still experiences exceedances of health-based standards for ozone, nitrogen dioxide (1-hour), carbon monoxide and $PM_{10}$. Of the federal and state standards exceeded in 1993 within the SCAB, the ozone standard was exceeded most often, followed by the CO and $PM_{10}$ standards. The SCAB has the worst ozone air quality in the nation and is the only area designated as "extreme" nonattainment for ozone.

The SCAB has been designated a non-attainment area because of violations of the national ambient air quality standards for carbon monoxide, nitrogen dioxide, total suspended particulates and photochemical oxidants. Of the federal standards which were exceeded in the SCAB in 1993, the ozone standard was exceeded most frequently, followed by CO and $PM_{10}$. Ozone levels also exceeded the federal standard by the widest margin, with a maximum concentration that was 215 percent of the standard, followed by carbon monoxide (154 percent) and $PM_{10}$ (145 percent of the annual standard). All metropolitan areas of the basin contribute to the oxidant levels experienced in the downwind areas, which peak in summer and early fall, when the solar radiation exposure of the air mass is the greatest.

---

3. Source: SCAQMD; *1994 AQMP Appendix III-A;* April 1994; Table 3-6 pg. III-8.
4. Source: SCAQMD; *1994 AQMP;* April 1994; Table 1-1, pg. 1-4.

Based upon 1992 data, the federal ambient air quality standards were exceeded more often in the SCAB than in any other area of the United States. Ozone causes most federal standard exceedances in the SCAB and Glendora led the nation with 118 days exceeding the federal ozone standard in 1992 and the highest recorded ozone concentration (0.30 ppm).

In 1992, the Los Angeles County recorded the greatest number of exceedances of the federal CO standard in the nation. The Lynwood station recorded the highest carbon monoxide concentration (18.8 ppm) and the greatest number of exceedances (31 days) of the federal standard. The SCAB is currently designated as a serious nonattainment area for CO under the federal Clean Air Act and is required to implement emissions reduction measures as expeditiously as practicable to attain federal CO standards by December 31, 2000.

The SCAB is also the only area in the United States in nonattainment of the federal $NO_2$ standard. The highest annual average $NO_2$ concentration in the nation (0.0507 ppm) was recorded in Pomona. During 1993, the state $NO_2$ standard was only exceeded once in the SCAB (in Los Angeles County) and the federal standard was not exceeded. Attainment of the federal $NO_2$ standard is expected to occur by 1995.

The air quality in the study area is a function of the primary pollutants emitted locally, the existing regional ambient air quality, and the meteorological and topographical factors that influence the intrusion of pollutants into the area from sources outside the immediate vicinity. The prevailing marine air currents throughout the SCAB typically carry polluted air inland as ozone-forming photochemical reactions proceed. That is why peak ozone concentrations in the SCAB are found in the inland valleys and adjacent mountains (between the San Fernando Valley and the Riverside-San Bernardino area), miles downwind of the largest concentrations of sources of precursor emissions.

As shown in Figure 2-2, far fewer ozone standard exceedances occur in the coastal, far inland, or desert areas than in Glendora, Fontana and Crestline. In 1993, the federal 1-hour ozone standard was exceeded most frequently in Glendora (96 days), while the state standard was exceeded most frequently in Redlands (160 days). Oxidant precursors from the coastal Los Angeles area aggravate oxidant problems inland in Riverside and San Bernardino, and precursor emissions from the central and eastern areas of the SCAB contribute to locally produced oxidant in the Coachella Valley.

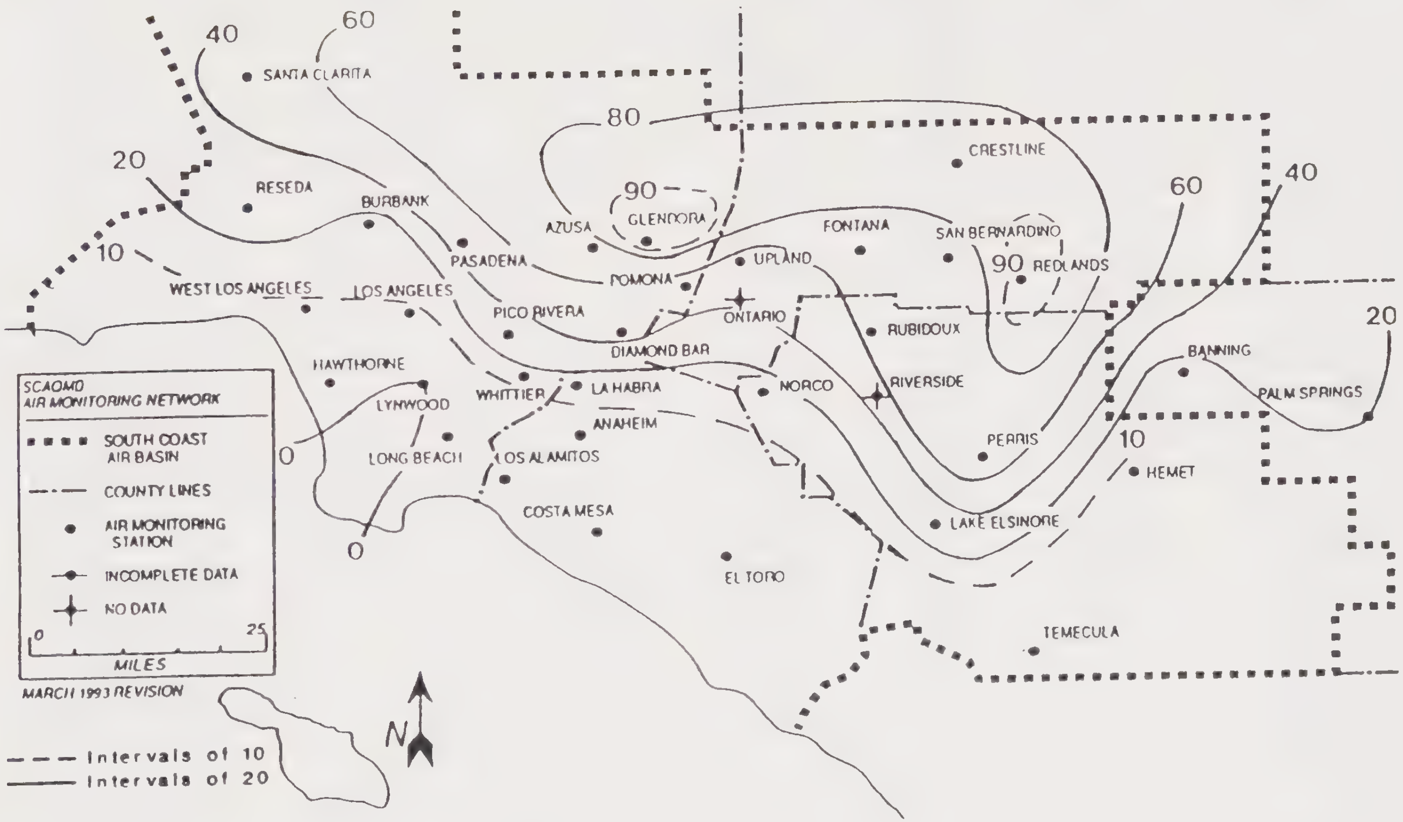
$PM_{10}$ levels in the SCAB are very high compared to most other areas. The federal $PM_{10}$ standards were exceeded in many areas within the SCAB between 1992 and 1994. The more stringent state $PM_{10}$ standards were exceeded in most areas, frequently by a wide margin. The highest annual average $PM_{10}$ concentration was recorded at Ontario (78.9 $ug/m^3$).

Figure 2-3 shows the 1993 annual average (arithmetic mean) $PM_{10}$ concentrations throughout the SCAB. As shown therein, the concentrations averaged lowest near the coast and highest in the inland valleys. In 1993, the federal annual standard was exceeded at 6 of the 21 monitoring sites. By comparison, the federal 24-hour standard was exceeded at 2 locations. The state annual standard was exceeded at 15 locations in 1993. The state 24-hour standard was exceeded at all 21 monitoring locations within the SCAB.

Figure 2-2

Number of Days Excceding Federal Ozone Standard in 1993

(1-Hour Average Concentration Greater than 0.12 ppm)



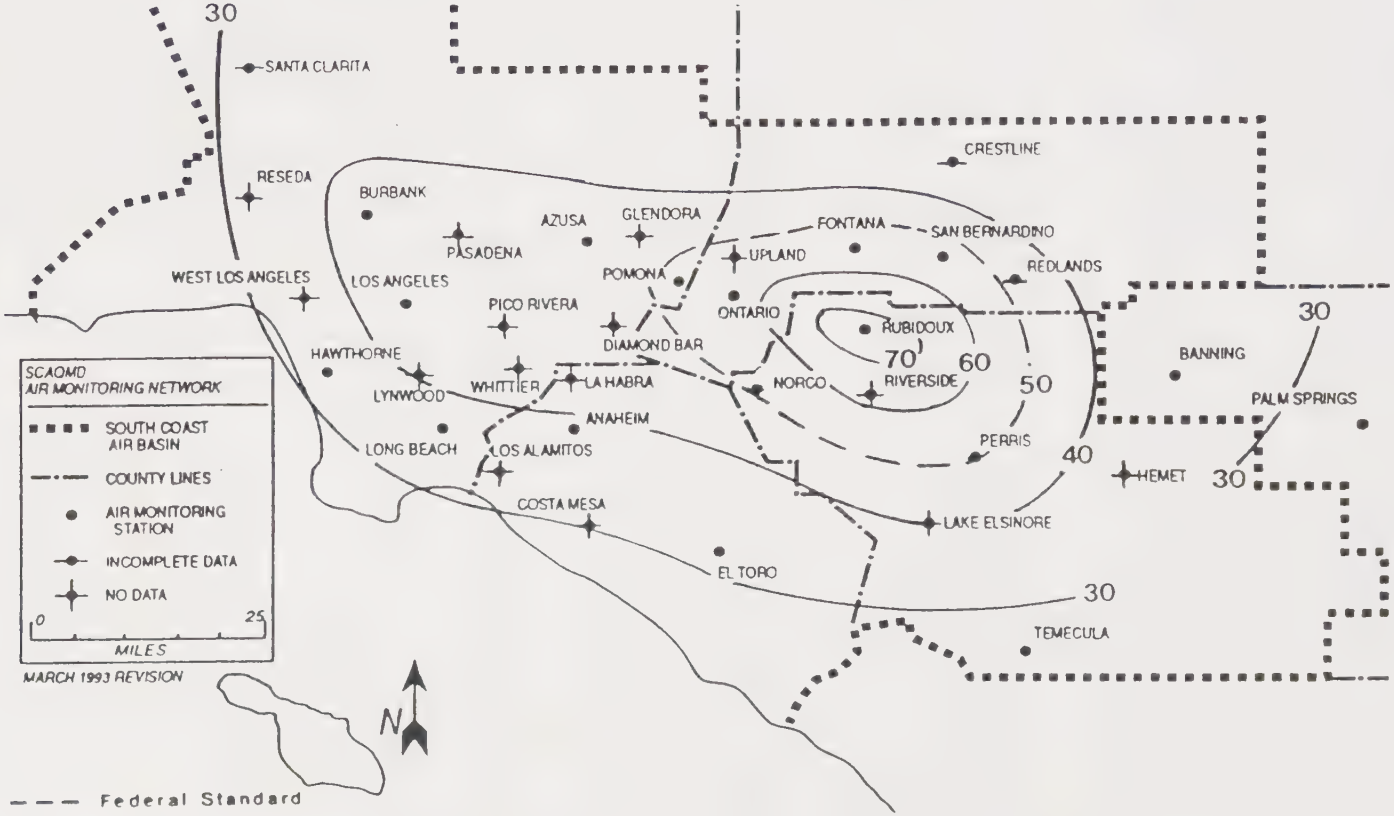

Endo Engineering

Source: SCAQMD; 1994 AQMP; April 1994.

Figure 2-3

1993 Annual Average $PM_{10}$ Concentrations Compared to Federal Standard

(Annual Arithmetic Mean Concentration Greater than $50ug/m^3$)




Endo Engineering

Source: SCAQMD; 1994 AQMP; April 1994.

## Regional Climate and Meteorology

The extent and severity of the air pollution problem in the SCAB is a function of its natural physical characteristics (weather and topography) as well as man-made influences (development patterns and lifestyle). Factors such as wind, sunlight, temperature, humidity, rainfall and topography all affect the accumulation and dispersion of pollutants throughout the basin. The interrelationships of these variables with the type and location of pollution generated in the basin are complex and variable.

The SCAB is comprised of a coastal plain with connecting broad valleys and hills that is bounded by the mountains and the Pacific Ocean. It lies in the semi-permanent high pressure zone of the eastern Pacific. The climate is controlled largely by the strength and location of the sub-tropical high pressure cell over the Pacific Ocean. The region has a Mediterranean climate with moderate temperatures (warm summers and mild winters), comfortable humidities, and precipitation limited to the short winter "rainy" season.

The land/sea breeze is the primary factor affecting the region's mild climate. The daytime winds are predominantly onshore sea breezes from the northwest which flow at relatively low velocities. The sea breezes exhibit velocities below 15 miles per hour (mph) approximately 96 percent of the time, and below 4 mph about half of the time, with an average velocity of 5 to 7 mph. During the night, the winds usually slow and reverse direction, traveling toward the sea. These land breezes flow from the southeast at 1 to 2 miles per hour.[5]

During the fall and winter months the basin is subject to moderate and strong Santa Ana winds. These dry warm northerly and northeasterly winds typically last for several days and exhibit velocities which exceed 40 mph at times.

During the spring and early summer, most of the air pollutants emitted daily are moved out of the basin through mountain passes, or lifted by warm vertical air currents produced by the heating of mountain slopes. In this manner, the basin is cleansed by the natural transport of ocean air inland. However, between June and September, lighter wind speeds, a shallow vertical mixing layer, and the earlier appearance of off-shore drainage winds all combine to reduce the dispersion of air pollution vertically and horizontally.

Throughout the SCAB, the vertical dispersion of air pollutants is restricted by the presence of a persistent temperature inversion near the surface (when temperature increases with altitude) that reduces the mixing height. Elevated inversions restrict vertical mixing and trap air pollutants within the mixing layer above the basin. On hot summer days, the inversion layer often remains, trapping pollutants in a limited mixing area until middle or late afternoon (when the inversion layer lifts, erodes, or surface winds are sufficient to disperse the pollutants horizontally). These inversions are partially responsible for the high concentrations of ozone that occur during summer months in the air basin.

Ground-based radiation inversions are more severe during clear cold early winter mornings. When ground based inversions persist, very little mixing or turbulence occurs and high concentrations of primary pollutants result near roadways and other pollutant sources. Winter inversions frequently weaken and erode by mid-morning, thereby preventing the accumulation of contaminants.

---

5. Source: SCAQMD, *Air Quality Handbook;* April 1987.

## 2.3 Local Air Quality

### Local Climate and Meteorology

The annual precipitation monitored during 1993 in Redlands was 24.9 inches, which was 12.10 inches above the average annual rainfall total normalized over the past 9 years. The annual average temperature in 1993 was 65.4 degrees Fahrenheit, which was one degree above normal. The monthly average temperature ranged from a low of 52.1 degrees Fahrenheit during January to a high of 77.4 degrees Fahrenheit in August. Temperature extremes in Redlands ranged from 31 to 108 degrees Fahrenheit during 1993.[6]

Wind direction and speed (which in turn affect atmospheric stability) are the most important climatological elements affecting the ambient air quality within the study area. As shown in Figure 2-4, the prevailing wind direction in the vicinity is predominantly from the west-southwest.

The annual mean wind speed is 4.1 miles per hour. Calm conditions occur 40.7 percent of the time at Norton Air Force Base. Since the dominant daytime onshore wind pattern follows the peak travel period (6:00 am - 9:00 am) in the Los Angeles/Orange County area, during periods of low inversions and low wind speeds, the photochemical smog formed in these areas is transported downwind into Riverside County, San Bernardino County and the Coachella Valley.

Four key elements are required to specify the meteorological conditions affecting the transport and dispersion of air pollutants. These include the wind direction, wind speed, atmospheric stability, and mixing height. Although regional meteorological conditions (such as temperature inversions, Santa Ana wind conditions, etc.) will dominate local conditions, wind direction, wind speed, and localized turbulence generated by local topographical conditions can play a key role in determining the ambient air quality within the study area.

### Local Air Quality

The project site is located within Source Receptor Area (SRA) 35. The three closest monitoring stations are located in Redlands, San Bernadino, and Crestline/Lake Gregory. These stations are representative of conditions in the east San Bernardino Valley, the central San Bernardino Valley, and the central San Bernardino Mountains, respectively. Since data in Redlands and Crestline was collected for only ozone and particulates, San Bernardino data (which is more comprehensive) is also addressed herein and provided in the Appendix.

The monitoring station in the City of Redlands records conditions that are the most representative of the Redlands Planning Area. The 1992 through 1994 ambient air quality data (which is included in the Appendix) indicates that ozone and $PM_{10}$ have exceeded the relevant state and federal standards in Redlands.

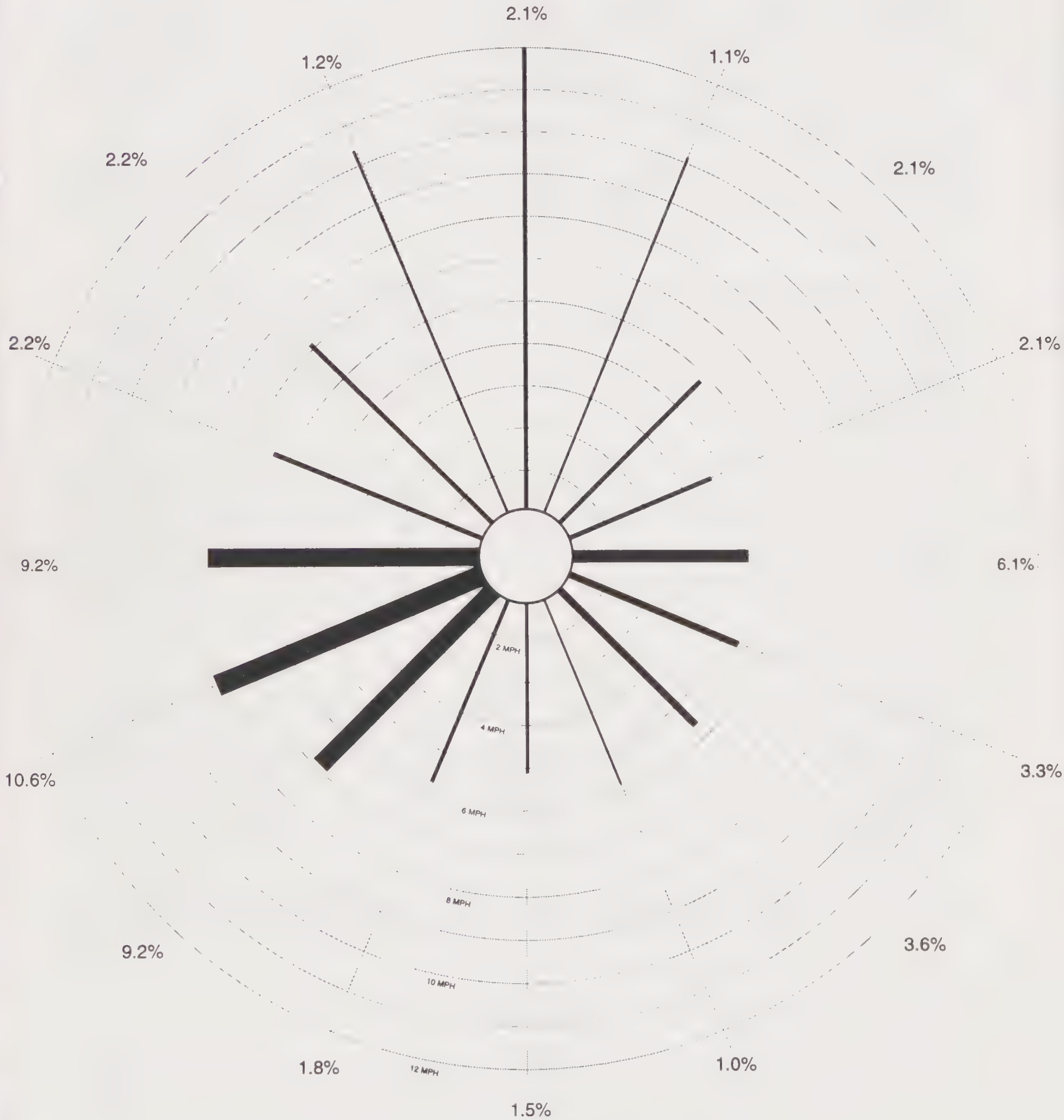
*Ozone*

The City of Redlands is located within the eastern part of the San Bernardino Valley, an area which often receives pollutant transport from the more westerly portions of the South Coast Air Basin. Poor ozone air quality in this area is due primarily to transport of both

---

6. Source: NOAA, *Climatological Data Annual Summary*, 1993.

## Figure 2-4
## Annual Surface Wind Rose Summary
(Norton AFB)




Note: Bar thickness represents percent of predominant wind direction.
Bar length indicates wind speed. Calm = 40.7% of time. Mean Speed = 4.1mph.

*Endo Engineering*

Source: CARB "California Surface Wind Climatology" 6/84.

ozone and its precursor emissions from the upwind source region of the South Coast Air Basin.

Ozone air quality trends since 1976 for the South Coast Air Basin indicate a downward trend in the number of days exceeding the federal 1-hour ozone standard, despite the fact that the population has grown in the South Coast Air Basin. Between 1980 and 1990, the population grew in the South Coast Air Basin by an average of 2.2 percent per year.

Figure 2-5 depicts the number of days from 1992 through 1994 exceeding the one-hour state ozone standard as well as the maximum hourly ozone concentrations at all three stations. Ozone levels exceeded the state one-hour standard (0.09 ppm) on 42 percent of the days monitored. The maximum one-hour ozone concentration measured was 0.28 parts per million (ppm). This is more than twice the federal standard and three times the level set as the state standard. The federal one-hour ozone standard (>.12 ppm) was exceeded on 22 percent of the days in San Bernardino and 27 percent of the days in Redlands and Crestline.

Numerous Stage I ozone episodes were called at all three stations between 1992 and 1994. During 1992, there were seven Stage I episode days in Redlands, 17 in San Bernadino and 22 in Crestline. During 1993, there were eight Stage I episode days in Redlands, four in San Bernadino and five in Crestline. No Stage II ozone episodes were declared at these air monitoring stations during the past six years.

Recent trends indicate that the frequency of ozone Stage I episodes in Redlands has decreased compared to the number of episodes throughout the County of San Bernardino and the South Coast Air Basin. For example, there were 7 Stage I episode days in Redlands compared to 31 countywide and 43 throughout the Basin during 1992. During 1993, Stage I ozone episodes were called on 8 days in Redlands, 15 days throughout the county and 23 days in the SCAB.

Maximum one-hour ozone levels measured in Redlands were very nearly the highest in the county and the basin. They reached 0.27 ppm in 1992 and 1993. The county maximum was 0.27 ppm in 1993 and 0.28 ppm in 1992. Maximum one-hour ozone levels measured throughout the SCAB were only slightly higher (0.28 ppm in 1993 and 0.30 ppm in 1992).

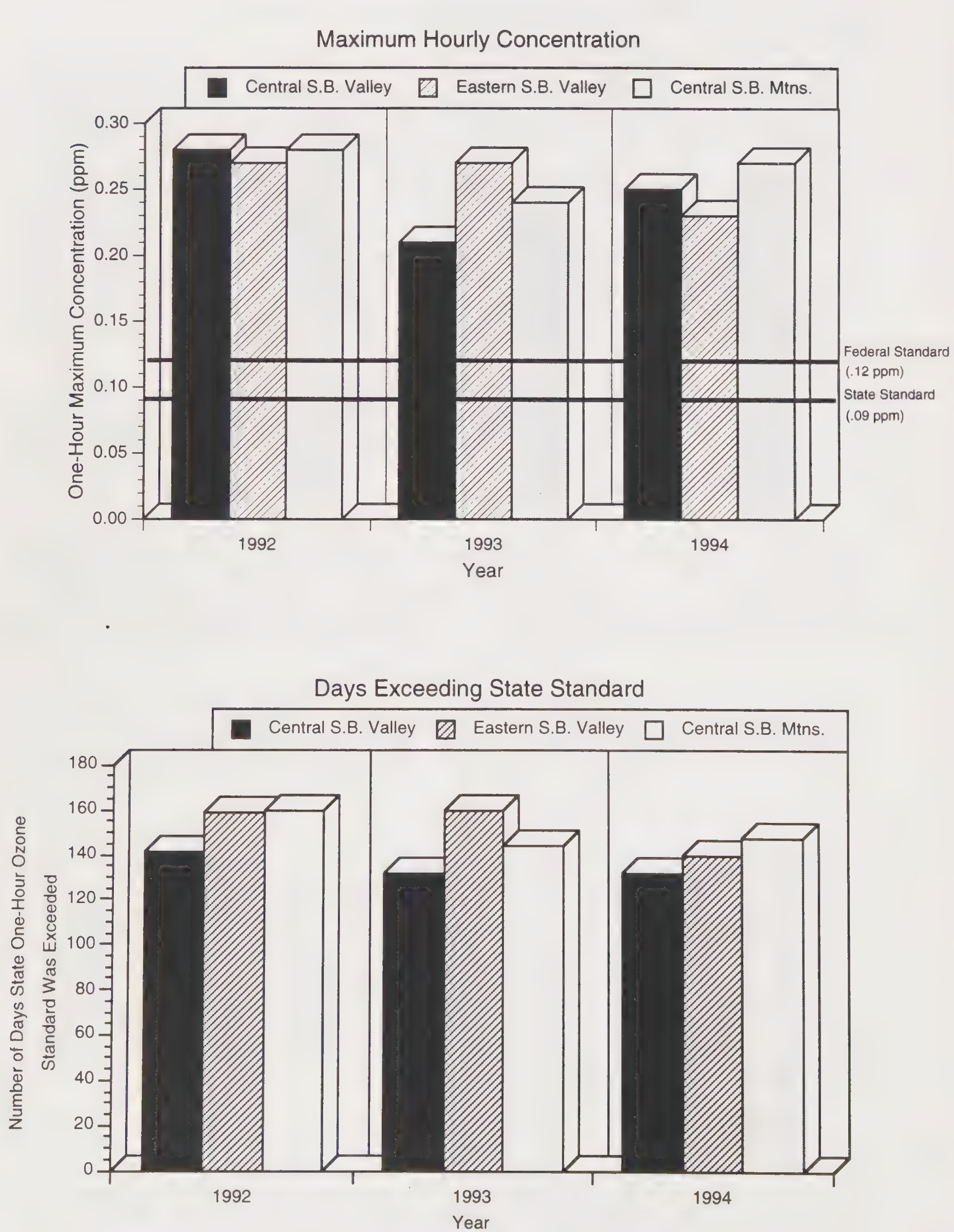
*Inhalable Particulate Matter ($PM_{10}$)*

Figure 2-6 depicts the percentage of $PM_{10}$ samples exceeding the state 24-hour standard from 1992 through 1994 as well as the maximum 24-hour $PM_{10}$ concentrations at the three closest air monitoring stations. During this period, $PM_{10}$ exceeded the California 24-hour standard during 62 percent of the monitoring periods at the San Bernardino station. The maximum 24-hour $PM_{10}$ concentration monitored there was 147 micrograms per cubic meter (nearly three times the state standard). In Redlands, $PM_{10}$ exceeded the California 24-hour standard of 50 micrograms per cubic meter during forty-three percent of the monitoring periods between 1992 and 1994. The maximum 24-hour $PM_{10}$ concentration monitored at the Redlands station was 138 micrograms per cubic meter (more than two and one-half times the state standard).

*Nitrogen Dioxide*

The federal annual average nitrogen dioxide standard was not exceeded at the San Bernardino station between 1992 and 1994. The maximum 1-hour $NO_2$ concentration was 0.18 ppm, which was 72 percent of the standard value. Similarly, the state 1-hour nitrogen

## Figure 2-5
## Relevant Ozone Data

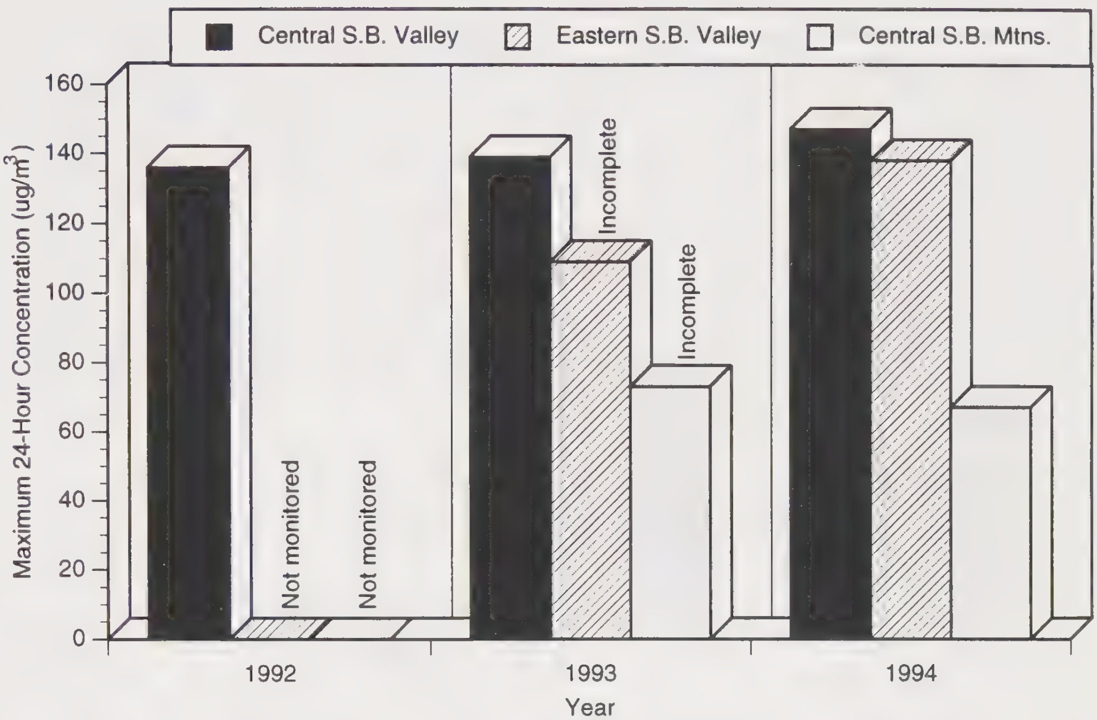



*Endo Engineering*

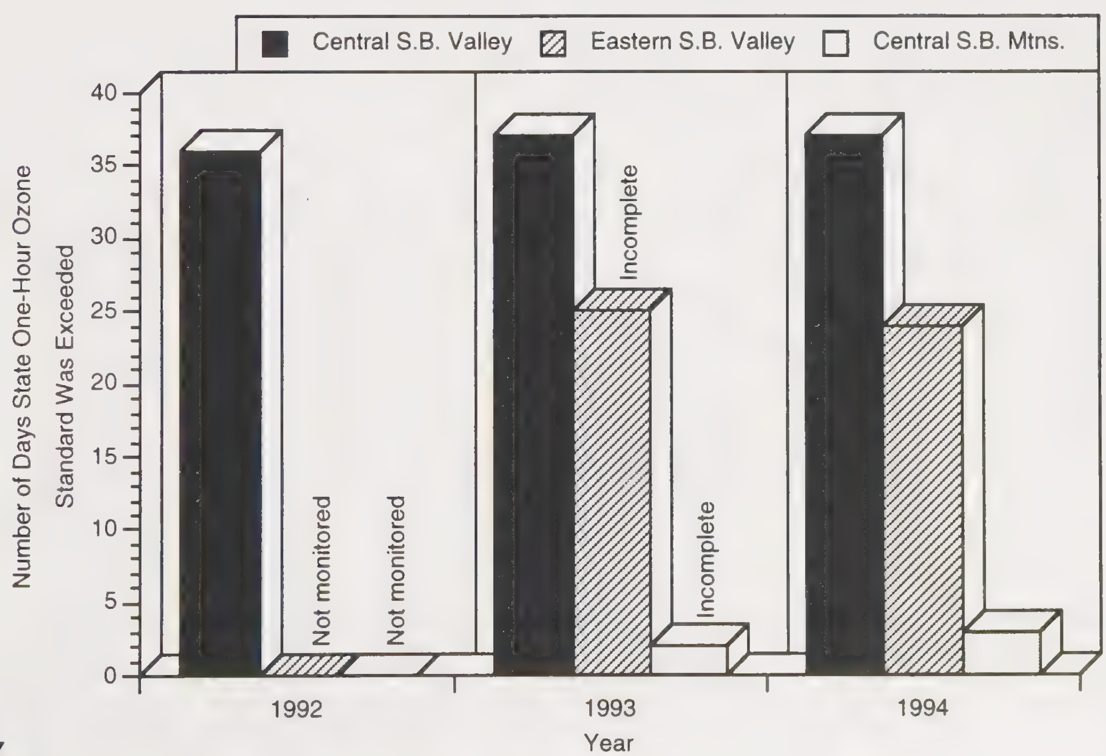
Source: SCAQMD, 1992-1994 Air Monitoring Data

# Figure 2-6
## Relevant $PM_{10}$ Data

Maximum 24-Hour Concentration




Percentage of PM10 Samples Exceeding State Standard




*Endo Engineering*

Source: SCAQMD, 1992-1994 Air Monitoring Data

dioxide standard was not exceeded in San Bernardino. $NO_2$ was not monitored in Crestline or Redlands.

*Carbon Monoxide*

The state and national 8-hour carbon monoxide (CO) standards were not exceeded at the San Bernardino station. There were no exceedances of either the state or federal one-hour CO standard (>20 ppm, and >35 ppm respectively) in San Bernardino. The highest maximum CO concentration measured during the last three years was 9 ppm (1-hour average) and 6.5 ppm (8-hour average). Carbon monoxide was not monitored in Redlands or Crestline.

*Other Criteria Pollutants*

Sulfate is monitored in San Bernardino, where the maximum 24-hour concentration was 17.2 $ug/m^3$. This level represents 69 percent of the standard. Sulfur dioxide is also monitored in San Bernardino. Sulfur dioxide levels were found to be less than 25 percent of the state and federal standards.

**Existing Sensitive Receptors**

Land uses considered by the SCAQMD to be sensitive receptors include the following:

- residences,
- schools,
- playgrounds,
- child care centers,
- athletic facilities.
- long-term health care facilities,
- rehabilitation centers,
- convalescent centers,
- retirement homes, and

If these receptors are located adjacent to a freeway or major intersection, carbon monoxide "hot spots" may occur during times of peak use. High levels of carbon monoxide are also associated with traffic congestion, and with idling or slow-moving vehicles, depending on the background CO concentration. Therefore, projects that could negatively impact levels of service at major intersections with nearby sensitive receptors must quantify and, if necessary, mitigate potential impacts.

Residential development exists adjacent to numerous intersections within the City of Redlands. To evaluate the potential for a CO "hot spot" at five "worst case" intersections that could affect pedestrians, they were modelled with the California Line Source Dispersion Model (CALINE 4) developed by Caltrans. The results are presented below.

**Local Sources of Air Contaminants**

*Existing Carbon Monoxide Concentrations*

Given the number of vehicles at key intersections, appropriate CO emission factors, local meteorology, site geometry and site characteristics, carbon monoxide concentrations can be projected through CALINE 4 computer modeling of intersections located within the Planning Area.

Because of the relative inertness of carbon monoxide in the photochemical smog formation process (and limitations of knowledge on dispersion characteristics of other air pollutant species) carbon monoxide is the most suitable tracer pollutant for microscale modeling. NOx and hydrocarbons were not considered because they are unstable and undergo

changes to become secondary pollutants; therefore, the roadway's contribution to these pollutant concentrations cannot be accurately assessed.

Nitric oxide concentrations can be predicted but there is no ambient air quality standard for NO. Nitrogen dioxide (which is the major constituent of NOx) is not directly predictable from conventional non-reactive models. Similarly, an accurate method to determine a roadway's contribution to local levels of SOx and particulate matter is not yet available. Secondary pollutants are a large-scale phenomenon, and should be analyzed on a regional basis rather than a local one.

As shown in Table 2-2, the 1-hour carbon monoxide concentrations (including background concentrations from the San Bernardino air monitoring data) are currently below the relevant state and national 1-hour carbon monoxide standards. The largest hourly CO concentration 11.9 ppm (2.9 ppm local + 9.0 ppm background) is expected at 50 feet from the centerline of the intersection of Alabama Street and Redlands Boulevard. Similarly, this intersection generates the highest 8-hour CO concentrations in the City of Redlands (9.0 ppm).

Table 2-2
Existing Carbon Monoxide Concentrations[a]
Adjacent to Key Intersections

| | 1-Hour Average (ppm) | | | 8-Hour Average (ppm)[c] | | |
|---|---|---|---|---|---|---|
| Receptor Distances[b] (Feet) | 50[d] | 100 | 200 | 50[d] | 100 | 200 |
| **Alabama Street @** | | | | | | |
| - Redlands Boulevard | 2.9 | 1.1 | 0.7 | 2.5 | 0.9 | 0.6 |
| - Lugonia Avenue | 1.2 | 0.5 | 0.3 | 1.0 | 0.4 | 0.3 |
| **Orange Street @** | | | | | | |
| - Redlands Boulevard | 2.4 | 1.0 | 0.6 | 2.1 | 0.9 | 0.5 |
| - Lugonia Avenue | 1.0 | 0.6 | 0.4 | 0.9 | 0.5 | 0.3 |
| **Citrus Avenue @** | | | | | | |
| - Judson/Ford Street | 1.0 | 0.6 | 0.4 | 0.9 | 0.5 | 0.3 |
| Background CO Concentration[e] | 9.0 | 9.0 | 9.0 | 6.5 | 6.5 | 6.5 |
| State CO Standard | 20 | 20 | 20 | ≥9.1 | ≥9.1 | ≥9.1 |
| Federal CO Standard | 35 | 35 | 35 | ≥9.5 | ≥9.5 | ≥9.5 |

a. See the Appendix for assumptions and input parameters.
b. Receptor distances are measured from the roadway centerline.
c. All 8-hour values were determined by assuming a persistence factor of 0.86 which was derived from the ratio of the 1993 highest 8-hour to 1-hour CO measurements in San Bernardino (0.6 ppm/0.7 ppm).
d. This receptor may be located within the roadway right-of-way.
e. Source: CARB, "California Air Quality Data", highest measured value between 1992 and 1994 at the San Bernardino monitoring station.

The comparison of the projected carbon monoxide levels shown in Table 2-2 with state and federal standards indicates the significance of the projected concentrations. Carbon monoxide concentrations adjacent to the intersections modeled are below the current 20 ppm state standard and the 35 ppm federal standard (1-hour average) at all intersections analyzed. Similarly, the state and federal 8-hour carbon monoxide standards are not exceeded at these intersections.

## 2.4 Regulatory Setting

### State and Federal Clean Air Act Requirements

The November 1990 amendments to the federal Clean Air Act (CAA) were intended to intensify air pollution control efforts across the nation. The CAA identifies specific emission reduction goals, requires both a demonstration of reasonable further progress (an incremental reduction in emissions of relevant air pollutants needed to ensure attainment of the national ambient air quality standards or NAAQS by the applicable date) and an attainment demonstration, and incorporates more stringent sanctions for failure to attain or to meet interim milestones. The CAA requires the SCAQMD to develop: a Federal Attainment Plan for Ozone; a post-1996 rate-of-progress demonstration; an ozone attainment demonstration; a $PM_{10}$ SIP which incorporates best available control measures (BACM) for fugitive sources; near-term (<year 2000) and long-term (>year 2000) transportation control measures and contingency measures (i.e. additional control measures which would be implemented in the event of a milestone or attainment failure).

The CAA classifies the SCAB as an extreme nonattainment area and states that the SCAB must achieve the federal ozone standard by November 15, 2010. The SCAQMD must demonstrate how the Basin will achieve VOC emission reductions of at least 3% per year averaged over each consecutive 3-year period beginning from November 15, 1996 and ending November 15, 2010.

In February 1993, EPA redesignated the SCAB and the Coachella Valley from moderate to serious nonattainment for $PM_{10}$. This was necessitated by the fact that the 1991 AQMP indicated that the implementation of reasonably available control measures (RACM) for fugitive dust would not ensure attainment of the $PM_{10}$ NAAQS by the CAA deadline of December 31, 1994. Consequently, the SCAQMD is required to prepare and adopt a $PM_{10}$ SIP for the SCAB and the Coachella Valley which incorporates best available control measures (BACM) for fugitive sources.

The California Clean Air Act (CCAA), which is generally more stringent than the federal CAA, was signed into law in 1988 and amended in 1992. The CCAA divides nonattainment areas into categories with progressively more stringent requirements, based on pollutant levels monitored therein. The SCAB is an extreme nonattainment area for ozone and a serious nonattainment area for CO and $NO_2$. $PM_{10}$ is not currently addressed in the CCAA. Serious and above nonattainment areas are required to revise their AQMP to include specified emission reduction strategies and to meet milestones in implementing emission controls and achieving better air quality.

The CCAA requires the establishment of indirect and area source controls to reduce vehicle miles traveled (VMT) and increase average vehicle ridership (AVR). It specifies the use of best available retrofit control technology for existing sources. The CCAA requires new source review to mitigate all emissions from new and modified permitted sources. It also requires consideration of transportation control measures (TCM's) and significant use of low-emission vehicles by fleet operators.

CCAA requirements for control strategy development that are addressed in the 1994 AQMP include:

- Rate-of-progress requirements (reducing pollutants contributing to nonattainment by 5% per year or the maximum feasible);

- AVR requirement (Achieving an average vehicle ridership during peak commute hours of 1.5 persons/vehicle by 1999);
- Ensure no net increase in motor vehicle emissions after 1997;
- Substantial decrease in VMT growth and vehicle trips;
- Reduce per-capita population exposure to severe nonattainment pollutants (Ozone, CO and $NO_2$ for the SCAB) according to a prescribed schedule;
- Rank control measures by cost-effectiveness and implementation priority.

**Air Quality Management Plan**

It is the responsibility of the South Coast Air Quality Management District (SCAQMD) to lead the regional effort to attain the state and national AAQS. The SCAQMD is charged with developing and implementing the *Air Quality Management Plan* and reducing emissions from industries, some mobile sources, and consumer products.

The *Air Quality Management Plan* (AQMP) for the SCAB was originally adopted in 1979. Subsequent revisions, as required by both state and federal Clean Air Acts, have occurred since that time. The currently adopted revision is the *1994 Air Quality Management Plan*. The purpose of the 1994 AQMP was to set forth a comprehensive program to lead the SCAB and Southeast Desert Air Basin portions of Los Angeles and Riverside Counties into compliance with all national and state air quality standards.

The 1994 AQMP addresses the following federal Clean Air Act requirements for all nonattainment areas within the SCAQMD's jurisdiction:[7]

- updated 1990 emission inventories for CO, VOCs, NOx, SOx and $PM_{10}$;
- revised demonstration of 15% reduction in VOC emissions by 1996 to meet rate-of-progress requirements;
- post-1996 VOC rate-of-progress requirements;
- an overall control strategy that meets federal Reasonably Available Control Measures (RACM) and Reasonably Available Control Technology (RACT) requirements;
- Transportation Control Measures;
- attainment demonstration for ozone including contingency measures;
- revised attainment demonstrations for CO and $NO_2$ including contingency measures; and
- Best Available Control Measures for $PM_{10}$.

The 1994 AQMP demonstrates attainment of the federal and state ambient air quality standards. It proposes to achieve the federal ozone and $PM_{10}$ standards through long-term measures that emphasize a greater reduction of nitrogen oxides emissions from on-road and off-road sources than previous versions of the AQMP. The 1994 AQMP includes a 1990 emissions inventory and future emissions forecasts that reflect demographic and economic growth forecasts by SCAG.

The 1994 AQMP calls upon local governments to play an active role in reducing mobile source emissions through the implementation of specific actions. Control Measure FC-4 in the 1992 Carbon Monoxide Plan combines all transportation control measures (TCMs) developed by SCAG for local government implementation to reduce VMT and vehicle trips.

---

7. The SCAB and those portions of the Southeast Desert Nonattainment Area (Antelope Valley and Coachella-San Jacinto Planning Area) are nonattainment areas within the SCAQMD's jurisdiction.

Additional actions which local governments can implement to reduce mobile source emissions are described and quantified in the SCAQMD *Trip Reduction Ordinance Handbook.*

With 90 percent of local governments committed to implementing TCMs as of 1992, local efforts are currently having (and will continue to have) a profound impact on improving air quality in the region by reducing emissions from mobile sources and enhancing mobility by decreasing congestion levels. Appendix IV-C to the 1994 AQMP *Transportation Control and Indirect Source Measure Recommendations from the SCAG Regional Council* details advanced transportation technology measures, transportation improvement measures, market incentives, indirect source controls and other programs intended to maximize emission reductions from mobile sources by integrating air quality, mobility and the economic development goals described in the Regional Comprehensive Plan.

The 1994 *Air Quality Management Plan* addresses the State Implementation Plan requirements under Title I of the federal Clean Air Act. The 1994 AQMP proposes an aggressive control strategy for VOC and NOx emission sources in the South Coast Air Basin to demonstrate attainment. Control of local VOC and NOx emissions will have little effect on ozone exceedances in the City of Redlands.

A comparison of the 1994 emission inventories for the South Coast Air Basin and the City of Redlands (Table 2-3) reveals why aggressive control of VOC and NOx emissions within the South Coast Air Basin is the most effective control strategy for ozone attainment in the City Of Redlands. Locally generated emissions are overwhelmed by upwind emissions generated within the South Coast Air Basin. The South Coast Air Basin emissions of VOC and NOx are more than 100 times those in the City Of Redlands. Improved air quality in the City of Redlands clearly depends on reduced emissions in the South Coast Air Basin.

Table 2-3
1994 Regional Emission Inventory Comparison

| Area | Emission Rate (Tons/Day) CO | VOC | NOx | SOx | $PM_{10}$ |
|---|---|---|---|---|---|
| South Coast Air Basin[a] | 5649 | 1216 | 1202 | 118 | 852 |
| City of Redlands[b] | 48.5 | 9.4 | 7.9 | 0.6 | 1.3 |

a. Source: SCAQMD, 1994 AQMP Appendix I-B, May 1994.
b. Source: Endo Engineering

Because local government provides the primary focus of land use and growth management decisions, no air quality management plan can succeed without the active participation of local government. Most of the control measures relating to local government are in the areas of trip reduction, energy conservation, and dust control. Control strategies from the AQMP that should be considered for adoption by local governments are listed in the Appendix.

Consistent with the need to reduce emissions from mobile sources, many control measures identified focus on alternatives to current transportation strategies. Ridesharing, carpooling,

flexible work schedules, parking management and the acquisition of clean-fueled fleet vehicles are a few of the transportation control measures to be considered for adoption by the City of Redlands. Also included are measures which call upon local jurisdictions to develop more efficient management programs for solid waste including: (1) recycling programs; (2) energy conservation programs; and (3) programs to reduce fugitive dust emissions. Nearly all of the measures call for the adoption of ordinances within the next five years to implement control programs.

The AQMP control measures will reduce emissions by:

- Maximizing reductions in the use of pollutant-emiting materials;
- Maximizing the substitution of non-polluting or less-polluting materials;
- Maximizing the use of the most efficient pollution control devices;
- Maximizing the compliance and maintenance programs for fugitive dust emissions;
- Maximizing the efficiency of the transportation infrastructure to provide less polluting forms of transportation;
- Maximizing the effectiveness of existing measures through improved administrative practices; and
- Maximizing strong public and private commitments for the required implementation actions.

### SCAQMD Rules and Regulations

The SCAQMD is responsible for controlling stationary air pollution sources. Therefore, its *Rules and Regulations* address a wide variety of industrial and commercial operations and require operational controls on many processes. In 1992, Rule 403 was amended to tighten controls on blowing dust from construction sites, landfills, open pit mines and other operations. This Rule 403 amendment was projected to reduce $PM_{10}$ emissions in the Coachella Valley alone by 22 tons per day.

Regulation XV (Rule 1501) requires employers of 100 or more at a single worksite to develop innovative ways to reduce employee trips, both through transportation alternatives (like carpools, vanpools and bicycle facilities) and other techniques (such as 4-day work weeks, telecommuting and subsidizing public transit options) and submit Trip Reduction Plans to the SCAQMD. Rule 1502 defines the term "worksite" as "... a building, or grouping of buildings...which are in actual physical contact or separated solely by a private or public roadway or other private or public right-of-way, and which are owned and operated by the same employer (or by employers under common control)." A Regulation XV task force was formed to consider modifications to Regulation XV by exploring alternate and more cost-effective vehicle pollution strategies that are consistent with state and federal mandates.

### City of Redlands General Plan and Municipal Code

The City of Redlands has the opportunity as part of their General Plan update procedure to develop and adopt a series of goals, objectives, policies, and implementation programs related to air quality. This allows the City to formulate policies such that the level of growth described in the Land Use Element and the demand for mobility served by the Circulation Element can be accommodated in a manner that is consistent with the air quality standards of regional, state and federal agencies.

In addition to policies related to land use, circulation, construction practices and fugitive dust, the City has adopted an ordinance that applies transportation control measures to new developments which receive discretionary approvals from the City. The TCM Ordinance (Chapter 18.224) implements the 1991 AQMP and 1992 Attainment Plan for Carbon Monoxide through strategies such as the designation of preferential parking spaces for vanpools; reduced parking requirements in return for vehicle trip reduction programs; and the provision of:

- on-site park-n-ride lots,
- shower facilities for those employees who bicycle or walk to work,
- passenger loading areas near buildings,
- on-site transit improvements,
- on-site telecommuting centers, and
- on-site video conferencing facilities.

## 3.0 AIR QUALITY IMPACT ANALYSIS

The South Coast Air Quality Management District is responsible for adopting, implementing and enforcing air quality regulations within the South Coast Air Basin. The SCAQMD reviews and comments on environmental documents for projects that may generate significant adverse air quality impacts. The SCAQMD advises the lead agency in addressing and mitigating the potential adverse air quality impacts caused by projects both during and after construction. However, the final decision on the significance of the air quality impacts lies with the judgment of the lead agency, which is the City of Redlands. This decision must be based upon several considerations including the following.

1) What is the intensity and type of project?
2) What is the location of the project (i.e. upwind of sensitive receptors or in areas with high pollutant concentrations)?
3) Will the project cause an exceedance of any air quality standard?
4) Will the project make a substantial contribution to an existing exceedance of an air quality standard?
5) Is the project inconsistent with the AQMP?
6) Will the project emit toxic or hazardous air pollutants?
7) Will the mitigation measures that are attached to the project mitigate the air quality impacts to the maximum extent feasible?

Two types of air pollutant sources must be considered with respect to the proposed General Plan: stationary sources and mobile sources. Stationary source considerations include emissions from construction activities and natural gas combustion, as well as emissions at the power plant associated with the electrical requirements of development. Mobile source considerations include exhaust emissions resulting from short-term construction activities and long-term vehicular travel associated with the proposed General Plan.

### 3.1 Short-Term Construction-Related Impacts

Short-term impacts on air quality will occur during the construction activities required to implement the land uses in the proposed General Plan. These adverse impacts will include:

1) air pollutant emissions at the power plant serving the site while temporary power lines are needed to operate construction equipment and provide lighting;
2) exhaust emissions from the construction equipment used on-site as well as the vehicles used to transport the off-highway construction equipment required to and from the site;
3) exhaust emissions from the passenger vehicles of the construction workers;
4) particulate emissions (fugitive dust) from excavation, grading and clearing activities on-site;
5) exhaust emissions from the heavy trucks used to haul soil to or from the site if the earthwork on-site is not balanced;
6) exhaust emissions from the heavy vehicles used to transport building materials to the site;
7) emissions related to the development of any recreational areas and landscaping; and

8) emissions from architectural coating and paving materials used on-site for buildings, roads, parking lots etc.

At the General Plan level of analysis, precise quantification of construction level emissions is not possible, since the City of Redlands has no direct control over the housing market, local financing or developer schedules. However, air quality impacts resulting from construction activities could be significant, as shown below. Consequently, mitigation measures are required to reduce these impacts. Potential mitigation measures for use as conditions of approval on a project-by-project basis are provided in Section 4.0. All applicable mitigation measures should be appropriately incorporated to reduce construction-related air quality impacts to the maximum extent feasible.

**Field Office Stationary Source Emissions**

Typically a field office is located at a construction site. Operation of a field office during construction activities would result in air pollutant emissions at the power plant supplying its electricity or from the use of gasoline-powered portable generators at the construction site. The Appendix includes air pollutant emission factors associated with the generation of electricity at the power plant. In general, a 1,000 square foot field office would generate negligible amounts of air pollution (.0104 pounds of CO, .0005 pounds of VOC, .0596 pounds of NOx, .0062 pounds of SOx, and .0021 pounds of $PM_{10}$ per day).

**Construction Period Exhaust Emissions**

Localized exhaust emissions will result from the use of construction equipment as the proposed General Plan is implemented. Exhaust emissions over a broader area will result from the transport of off-highway equipment and the construction crews to and from various construction sites within the Redlands Planning Area.

Diesel construction equipment constitutes approximately 90 percent of the heavy construction machinery in use today. It emits, on the average, almost two pounds of NOx (and smaller amounts of CO and VOC) for each hour of usage (EPA, AP-42). Construction equipment emission rates on very active days may total several hundred pounds of contaminants per hour.

The SCAQMD has derived a generalized factor (250,000 brake horsepower hours of energy to develop one acre of vacant land) for use in estimating construction equipment emissions for General Plan analyses. Although the total emissions from construction equipment that would result from developing the 10,486 vacant acres involved in the proposed General Plan Update are finite, the daily emission rate would vary with the time interval over which the construction activities occurred and the level of construction activity at any given time.

The construction period emissions that would be generated to develop 10,486 vacant acres are shown in Table 3-1 in terms of pounds or tons emitted over the entire construction period (rather than pounds per day). Consequently, it is difficult to compare them to the SCAQMD significance thresholds, which are given in term of emissions per day or per quarter in Table 3-2. To facilitate this comparison and thereby identify the potential significance of the short-term impacts, assumptions were made regarding the construction interval required to implement the proposed General Plan.

## Table 3-1
## Construction Period Equipment Exhaust Emissions[a]

| Scenario/Pollutant | Construction Equipment Exhaust Emissions (Pounds) | (Tons) |
|---|---|---|
| **Emissions Generated To Develop 10,486 Acres** | | |
| CO | 26,561,454 | 13,281 |
| VOC | 5,831,971 | 2,916 |
| NOx | 63,574,262 | 31,787 |
| SOx | 5,381,581 | 2,691 |
| PM10 | 5,208,355 | 2,604 |
| **Daily Emissions Generated To Develop 2.0 Acres Per Day[b]** | | |
| CO | 5,066 | 2.53 |
| VOC | 1,112 | 0.56 |
| NOx | 12,126 | 6.06 |
| SOx | 1,026 | 0.51 |
| PM10 | 993 | 0.50 |
| **Daily Emissions Generated To Develop One Acre Per Day[b]** | | |
| CO | 2,533 | 1.27 |
| VOC | 556 | 0.28 |
| NOx | 6,063 | 3.03 |
| SOx | 513 | 0.26 |
| PM10 | 497 | 0.25 |

a. See the construction period equipment emissions worksheet in the Appendix for emission factors, assumptions and calculations.

b. The rate of development is a variable that is controlled by the economic climate and cannot be estimated with any degree of accuracy at the General Plan level of analysis. A development rate of one acre per day, for example, implies that a 1,000 acre site could be fully developed within 1,000 days and the General Plan could be implemented over the next 40 years. A development rate of 2.0 acres/day would imply buildout over a 20-year period (with construction activities assumed to occur on 260 days/year).

## Table 3-2
## SCAQMD Significance Threshold Criteria[a]
(Pounds/Day)

| Pollutant | CO | VOC | NOx | SOx | PM10 |
|---|---|---|---|---|---|
| **Daily Operations Emissions Thresholds** | | | | | |
| - Pounds/Day | 550 | 75 | 100 | 150 | 150 |
| **Quarterly Construction Emissions Thresholds** | | | | | |
| - Pounds/Day | 550 | 75 | 100 | 150 | 150 |
| - Tons/Quarter | 24.75 | 2.5 | 2.5 | 6.75 | 6.75 |

a. SCAQMD, *CEQA Air Quality Handbook;* November, 1993.

For a "worst case" short-term impact assessment, it was assumed that 10,486 acres of vacant land could be developed within 20 years. Given that 260 working days per year are typically available to construction crews, 2.0 acres would need to be developed per day to complete 10,486 acres of development in 20 years. Table 3-1 provides the construction equipment emissions by pollutant, assuming 2.0 acres are developed per day within the Planning Area. It also shows the daily emissions if only one acre were developed per day in the Planning Area and General Plan buildout were to require 40 years to complete.

It can be seen from Table 3-1 and Table 3-2 that development at a rate of one acre per day within the Planning Area would result in exceedances of the SCAQMD threshold criteria for all pollutants. In fact, if the City of Redlands were to opt solely to reduce the rate of development in an attempt to avoid exceedances of the SCAQMD thresholds, it would have to restrict the rate of development within the study area to a maximum of 0.016 acre per day. At that development rate, the General Plan would not be implemented until more than 2,500 years had elapsed. Clearly, other measures are required to minimize short-term emissions. Any development would generate a significant short-term impact and it is virtually impossible to mitigate short-term construction impacts to a level of insignificance.

The SCAQMD recommends a series of mitigation measures that can assist in reducing construction emissions (see Section 4.0). These measures rely on the use of diesel rather than gasoline-powered equipment, keeping the construction equipment well-tuned and employing activity management techniques (rescheduling for use in off-peak hours or using fewer pieces of equipment for a longer period of time).

### Graded Surface $PM_{10}$ Emissions

Sources of construction activity $PM_{10}$ typically include: grading, demolition (when applicable), heavy-duty equipment on paved and unpaved roads and the loading and unloading of trucks when cut and fill quantities are not balanced on a particular site. An average $PM_{10}$ emission factor for construction activities is 26.4 pounds of $PM_{10}$ per day per acre disturbed.[1] This factor can be reduced by half through regular watering.

Since the number of disturbed acres can not be accurately estimated at the General Plan level of analysis, an effort has been made to determine the number of acres that can be graded or disturbed without exceeding the SCAQMD significance threshold of 150 pounds of $PM_{10}$ per day. It was determined that with adequate water control, 11 acres could be disturbed daily without exceeding the threshold. Water control is a standard requirement of the City of Redlands. Refer to the Appendix for assumptions and calculations.

Based on the SCAQMD graded surface factor of 26.4 pounds of $PM_{10}$ per day per acre, with 1 to 2 acres of the Planning Area in a disturbed state on 65 working days per quarter) construction, of a future project would generate 26.4 to 52.8 pounds of $PM_{10}$ per day or 0.9 to 1.7 tons of $PM_{10}$ per quarter.[2] Therefore, surface grading $PM_{10}$ emissions will not exceed the SCAQMD significance threshold of 6.75 tons per quarter.

Future project proponents will comply with SCAQMD Rule 403 (see the Appendix) which prohibits the release of fugitive dust emissions from any active operation, open storage pile, or disturbed surface area beyond the property line of the emission source. Particulate matter deposits on public roadways are also prohibited. Future project proponents will be required to comply with all reasonably available control measures, as part of the development review process.

---

1. SCAQMD, *CEQA Air Quality Handbook; 11/93; Table A9-9; pg A9-93.*
2. SCAQMD, *CEQA Air Quality Handbook*, April 1993, Table 9-9.

**Paving Material and Architectural Coating Emissions**

Volatile organic compound (VOC) emissions will occur as a result of surface coating and paving materials used during future construction processes. SCAQMD Rule 1108[3] prohibits the use of rapid and medium cure cutback asphalts in the South Coast Air Basin (asphalt can contain no more than 0.5% by volume organic compounds). Further, Rule 1108.1 prohibits any organic compounds in emulsified asphalts. Therefore, it is expected that VOC emissions, as a result of paving activities, will be minor.

The volatile organic compound content of architectural coating materials (paint, varnish, lacquer, primer, etc.) will not be permitted to exceed the SCAQMD's Rule 1113 architectural coating threshold of 2.08 pounds of VOC per gallon. Most, if not all, of the VOCs will evaporate during the surface coating application and drying process. To minimize VOC emissions during future surface coating operations, the use of water-based enamels will be encouraged to the extent feasible and the use of lacquers shall be discouraged.

## 3.2 Long-Term Operational Impacts

### Air Pollutant Emission Projections

Emission projections can be made for the proposed General Plan buildout year by multiplying anticipated motor vehicle, natural gas, and electrical usage rates by the appropriate emission factors (EMFAC7EP). The results obtained in this manner are detailed in the Appendix and summarized in Table 3-3, which provides the future daily buildout air pollutant emissions associated with the proposed General Plan.

Table 3-3
Proposed General Plan Buildout Air Pollutant Emissions[a]

| Primary Pollutant | Natural Gas (Lbs./Day) | Electricity (Lbs./Day) | Vehicular (Lbs./Day) | Total (Lbs./Day) |
|---|---|---|---|---|
| CO | 16.24 | 142.08 | 96,852.64 | 97,011 |
| VOC | 4.30 | 7.10 | 18,885.68 | 18,897 |
| NOx | 500.91 | 816.96 | 14,465.42 | 15,783 |
| SOx | Negl. | 85.25 | 1,153.21 | 1,238 |
| $PM_{10}$ | 0.16 | 28.42 | 2,521.71 | 2,550 |

a. See the Appendix for assumptions and calculations. Year 2009 EMFAC7EP emission factors were assumed.

The proposed General Plan would generate 97,011 pounds of carbon monoxide, 18,897 pounds of volatile organic gases, 15,783 pounds of NOx, 1,238 pounds of SOx and 2,550 pounds of particulates daily, once completed. These emissions projections include hot start, cold start, hot soak, and diurnal emissions. Of the total project-related emissions, approximately 1.2% would be emitted by stationary sources and 98.8% would be emitted over a broad area by motor vehicles.

3. Telephone communication with Ms. Linda Basilio, SCAQMD, on 4/30/93.

### Significance of Long-Term Emissions

As shown in Table 3-4, buildout of the proposed General Plan would exceed the SCAQMD threshold criteria for all pollutants on a long-term basis. Since long-term project-related emissions would be considered a significant adverse impact by the SCAQMD, mitigation strategies designed to improve the area jobs/housing balance and reduce VMT should be incorporated in future projects to the maximum extent feasible to reduce adverse long-term effects on air quality.

Table 3-4
Significance Of Long-Term Impacts

| Primary Pollutant | Proposed General Plan Buildout Emissions (Lbs./Day) | SCAQMD Threshold[a] (Lbs./Day) |
|---|---|---|
| CO | 97,011 | 550 |
| VOC | 18,897 | 75 |
| $NO_x$ | 15,783 | 100 |
| $SO_x$ | 1,238 | 150 |
| $PM_{10}$ | 2,550 | 150 |

a. SCAQMD. *CEQA Air Quality Handbook;* November, 1993.

### Toxic and Hazardous Emissions

Although the number and nature of future additional air pollutant point sources is presently unknown, each individual source will be required to comply with South Coast Air Quality Management District Rules and Regulations. Air pollution regulations at the state and federal level have historically focused on the criteria pollutants (NOx, SOx, CO, lead, particulates, and ozone). However, in the past decade, there has been growing concern regarding the potential impacts of other harmful pollutants emitted to the air. These are generally referred to as toxic air contaminants or "air toxics". As of April 1991, fourteen toxic air contaminants have been identified as cancer-causing.

The SCAQMD has developed a number of rules and regulations directed at "air toxics" and criteria pollutants with the objective of setting forth pre-construction review requirements for new, modified or relocated facilities. These regulations require that sources of hazardous materials or criteria pollutants above threshold levels obtain permits prior to operation of the facility. Overall, the specific air quality goal is to achieve annual emission reductions that are at least five percent greater than the total annual emission increases from the new or modified equipment.

### Air Quality Projections

An assessment of the project-related impact on localized ambient air quality requires that future ambient air quality levels be projected. Carbon monoxide concentrations were estimated adjacent to nearby intersections carrying appreciable volumes of project-related traffic using the California Department of Transportation Line Source Dispersion Model (CALINE 4).

Carbon monoxide levels in the project vicinity during peak hour traffic were assessed with the CALINE 4 computer model at the intersections most affected by project-related traffic. To simulate "worst case" meteorological conditions, a wind speed of 0.5 meter per second (1 mph) and Stability Class G were assumed for 1-hour averaging periods. A "worst case" wind direction of ten degrees from parallel on the highest volume roadway link was assumed since near parallel winds result in the highest carbon monoxide concentrations at receptors adjacent to the roadway. A comparison of the projected carbon monoxide levels to state and federal standards indicates the significance of the projected concentrations.

Since eight-hour traffic projections were unavailable, eight-hour carbon monoxide levels could not be projected directly with the CALINE 4 model. However, Caltrans has developed a recommended methodology for projecting 8-hour concentrations from the 1-hour CALINE 4 forecasts. The methodology multiplies the concentrations generated by local roadways (total concentrations less background) by a persistence factor. This quantity is then added to a suitable 8-hour background concentration. It has been determined that the appropriate persistence factor is 0.86 for the Redlands Planning Area.

The scenario analyzed reflects buildout traffic volumes for the proposed General Plan in the City of Redlands. As shown in Table 3-5, carbon monoxide concentrations adjacent to the five intersections analyzed will be below the 20 ppm state standard and 35 ppm federal standard (1-hour average) with buildout of the proposed General Plan. Similarly, the state and federal 8-hour carbon monoxide standards will not be exceeded in the Redlands Planning Area if the future background CO concentrations remain at the levels projected in the SCAQMD *CEQA Air Quality Handbook*.

Table 3-5
Proposed General Plan
Buildout Carbon Monoxide Concentrations[a]

| | 1-Hour Average (ppm) | | | 8-Hour Average (ppm) | | |
|---|---|---|---|---|---|---|
| Receptor Distances[b] (Feet) | 50 | 100 | 200 | 50 | 100 | 200 |
| **Alabama Street @** | | | | | | |
| - Redlands Blvd. | 1.3 | 0.9 | 0.5 | 1.1 | 0.8 | 0.4 |
| - Lugonia Avenue | 1.4 | 0.8 | 0.5 | 1.2 | 0.7 | 0.4 |
| **Orange Street @** | | | | | | |
| - Redlands Blvd. | 1.4 | 0.5 | 0.3 | 1.2 | 0.4 | 0.3 |
| - Lugonia Avenue | 0.9 | 0.5 | 0.3 | 0.8 | 0.4 | 0.3 |
| **Citrus Avenue @** | | | | | | |
| - Judson/Ford Street | 0.5 | 0.3 | 0.2 | 0.4 | 0.3 | 0.2 |
| Background CO Concentration[c] | 5.3 | 5.3 | 5.3 | 3.9 | 3.9 | 3.9 |
| State Standard | 20.0 | 20.0 | 20.0 | ≥9.1 | ≥9.1 | ≥9.1 |
| Federal Standard | 35.0 | 35.0 | 35.0 | ≥9.5 | ≥9.5 | ≥9.5 |

a. Year 2009 emission factors were assumed, since none are currently available for the buildout year.
b. Receptor distances are measured from the roadway centerline.
c. Source: SCAQMD, *CEQA Air Quality Handbook*; 11/93; Tables 5-2 and 5-3, pg. 5-15 and 5-16.

Over a 1-hour averaging period, "worst-case" traffic associated with buildout of the proposed General Plan would contribute up to 1.4 ppm to the carbon monoxide concentration at 50 feet from the roadway centerines. The highest carbon monoxide level expected will occur at 50 feet from the intersection of Redlands Boulevard at Orange Street It will reach 6.7 ppm over a 1-hour averaging period and 5.1 ppm over an 8-hour averaging period.

A project has a significant impact if it interferes with the attainment of the state 1-hour or 8-hour carbon monoxide standards by either exceeding them or contributing to an existing or projected violation. The proposed project will not cause state CO standard exceedances in the vicinity or contribute to an existing or projected violation.

### 3.3 Alternative Impact Assessment

Long-term emission projections can be made for each project alternative to demonstrate their emission potential for comparison to that of the proposed General Plan. Table 3-6 provides the results of the analysis. Detailed assumptions and calculations are provided in the emission inventory worksheets in the Appendix.

For comparative purposes, Table 3-6 also shows the daily emissions associated with existing land uses within the Redlands Planning Area. It should be noted that the emission factors utilized to estimate these daily emissions represent 1994 conditions, whereas the emission factors used to forecast buildout emissions for each of the other alternatives represent post 2009 conditions. Consequently, while the daily emission burden associated with existing land uses is not directly comparable to buildout values, it does indicate that upon buildout of the proposed General Plan, emissions of each pollutant (except VOC) will be greater than they are at present.

The reduction in total emissions shown in Table 3-6 between existing land uses and Alternative 3 (No Development) reflects a decrease in motor vehicle emission factors between 1994 and General Plan buildout. This decrease in motor vehicle emission factors results from the gradual replacement of motor vehicles without emission control equipment as well as the deterioration of vehicles with emission control equipment as they grow older and accumulate mileage.

Although an increase in housing and employment in Redlands will cause an increase in future VMT, future emission factors are significantly lower than current emission rates as shown in Figure 3-1 and will offset the increase in VMT somewhat. For example, future year 2009 running exhaust and evaporative emissions rates for 30 mph are 29% of 1993 rates for CO, 13.5% of 1993 rates for ROC, 33.8% of 1993 rates for NOx, and 95.5% of 1993 rates for $PM_{10}$.

It should also be noted that moving exhaust air pollutant emission factors vary with vehicle speed. Figure 3-2 illustrates the variation for 1993 and year 2009 conditions between 5 and 55 miles per hour. It can readily be seen that CO emissions increase dramatically at lower speeds (particularly under 15 mph). This phenomenon is important in the modeling of CO concentrations near intersections. Clearly, the less congestion and delay that occurs at intersections, the better the surrounding air quality.

## Table 3-6
## General Plan Buildout Emissions By Alternative[a]
(Tons/Day)

| Pollutant | Existing Land Uses (1994) | Proposed General Plan Alternative 1 | Existing General Plan Alternative 2 | No Development Alternative 3 | Reduced Development Alternative 4 | Reduced Traffic Alternative 5 |
|---|---|---|---|---|---|---|
| CO | 48.5 | 56.4 | 59.9 | 26.1 | 49.0 | 46.4 |
| VOC | 9.4 | 6.2 | 6.6 | 2.9 | 5.4 | 5.1 |
| NOx | 7.9 | 11.9 | 12.7 | 5.4 | 10.1 | 9.8 |
| SOx | 0.6 | 1.0 | 1.1 | 0.5 | 0.9 | 0.9 |
| $PM_{10}$ | 1.3 | 1.9 | 2.0 | 0.9 | 1.7 | 1.6 |

a. See the emission inventory worksheets in the Appendix for assumptions and calculations. All buildout emissions assume 2009 emission factors. The emission burden includes cold start, hot start, hot soak, and diurnal emissions. Hot start and cold start emissions are incremental vehicle emissions that occur during initial vehicle operation and include VOC, CO, and NOx from exhaust. Cold start emissions occur when the vehicle is cold (at least 4 hours since operation for non-catalyst vehicles and at least 1 hour for catalyst vehicles). Hot start emissions occur when the vehicle is started when still warm. After traveling 3.54 miles, a vehicle is no longer operating in the cold start mode. Diurnal emissions are evaporative emissions of total organic gases from vehicles caused by the temperature change during a typical day. Diurnal emissions are measured in an enclosure where a heating blanket is placed on a vehicle's fuel tank to change the temperature from 60 to 84 degrees Fahrenheit over a period of one hour. The change in hydrocarbon concentration in the enclosure is then used to measure diurnal evaporative emissions. Hot soak emissions are evaporative emissions which occur when a vehicle is parked after a period of normal operation. Fuel evaporates from carburetors and other parts of the fuel system after the vehicle is turned off, when air and fuel are no longer being drawn into the engine and the engine temperature rises.

Regardless of which alternative is implemented, significant quantities of criteria pollutants will be emitted that are directly or indirectly attributable to the project. These emissions will substantially contribute to air quality violations. Total daily emissions will substantially exceed all "significant threshold criteria" established by the SCAQMD. Therefore, mitigation measures are required to reduce the long-term operational air quality impacts associated with the project. In addition to those measures outlined in Table 4-1, any other measures that are feasible should be investigated and included where possible.

For example, since this basin is a nonattainment area for four criteria pollutants (ozone, CO, $NO_2$ and PM10), any alternative that reduces air quality impacts in terms of these pollutants or ozone precursors should be given careful consideration. Alternatives 3, 4, 5 would reduce regional air quality impacts by a significant margin as a result of their lower traffic generation. In this respect, they are environmentally superior to the proposed General Plan (Alternative 1). However, their impact on the area jobs/housing balance is also of critical concern with regard to long-term air quality impacts, as discussed in Section 3.4.

Projects with daily operational emissions that exceed any of the long-term operational significance thresholds established by the SCAQMD (see Table 3-2) should be considered to be significant. The project will have a significant operational impact from the perspective that all of the SCAQMD operational threshold criteria will be exceeded, regardless of which alternative is approved.

## 3.4 Relevant Planning Programs

### Air Quality Management Plan

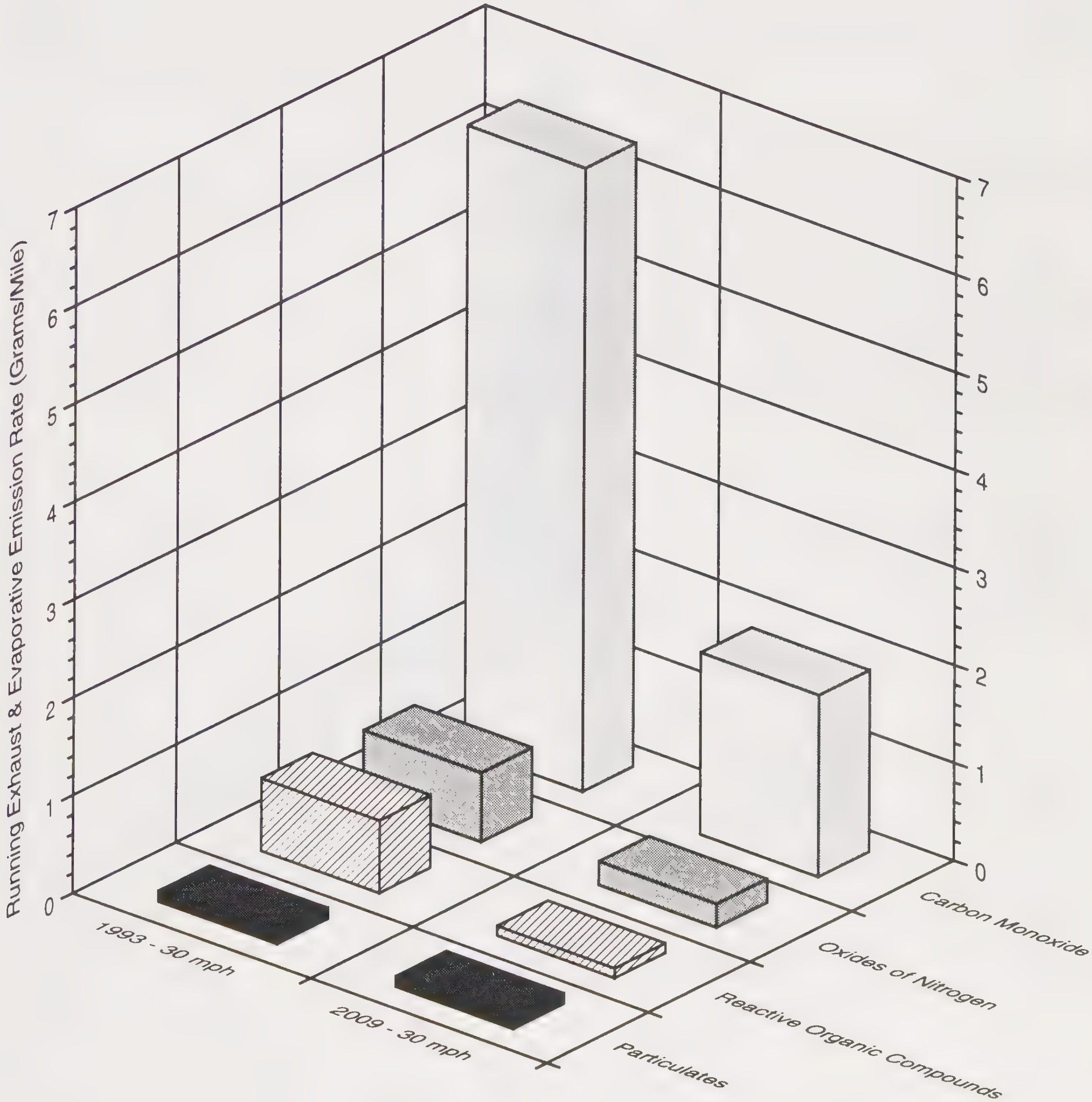
Many of the land use, growth management and transportation policies specified as control measures in the AQMP can only be implemented through inclusion in local General Plans. Unless a local commitment is made to use existing resources more efficiently with emphasis on conservation tactics and the substitution of renewable resources for non-renewable ones, the air quality benefits from the control measures outlined in the AQMP will not be realized.

Providing a balance between employment opportunities and the local housing supply lowers emissions by producing shorter commutes, more efficient travel patterns and reduced congestion. Local land use plans provide the most efficient mechanism for anticipating, controlling and limiting changes to the mix, location and density of land use to balance jobs and housing. the AQMP suggests that local jurisdictions counteract the incentive to develop open spaces and agricultural land by preserving these uses and using developed land more efficiently by in-filling, redeveloping, and land use intensification.

Measure N, a zoning ordinance amending Proposition R, was developed to assist the City of Redlands in carrying out its planning and zoning programs so as to limit the City's future growth; preserve Redlands' quality of life; ensure that housing goals are met; ensure the City's ability to provide needed services; and minimize utility rate increases. This measure limits residential development within the City of Redlands to 400 dwelling units per calendar year. Moreover, if less than 400 units are approved or constructed in any given year, the unused number cannot be carried forward to any future year.

In addition, development within the unincorporated portions of the Redlands Planning Area is limited to 150 dwelling units per calendar year. Consequently, future residential growth within the Redlands Planning Area will be limited to a maximum of 550 dwelling units per

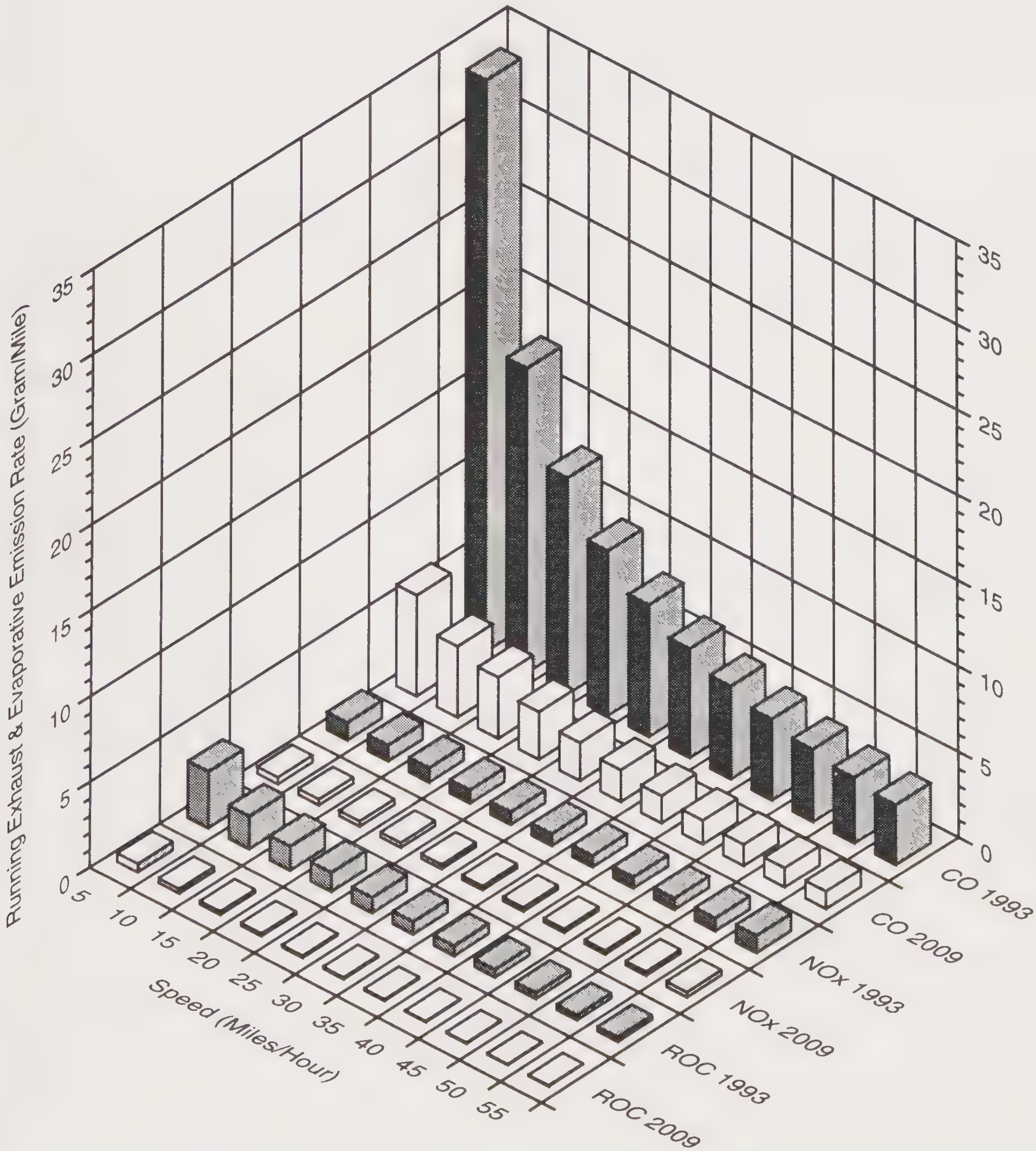
Figure 3-1
Current Versus Future Motor Vehicle Emission Rates




Endo Engineering

Source: SCAQMD; CEQA Air Quality Handbook; 11/93; Tables A9-5-J-2 and A9-5-J-10.

## Figure 3-2
## Motor Vehicle Emission Rates Versus Speed




Endo Engineering

Source: SCAQMD; CEQA Air Quality Handbook; 11/93; Tables A9-5-J-2 and A9-5-J-10.

calendar year through the General Plan buildout year. Given this limiation on residential growth of 550 dwellings per year, a total of 8800 new dwellings could be constructed in the Planning Area by the year 2000. However, the current demand for building permits is only a few per year, and will probably remain far below the cap for a number of years.

The SCAG 2010 forecast includes 37,846 dwelling units within the Redlands Planning Area. There are 26,906 dwelling units in this area at present. Therefore, 10,940 new dwelling units can be constructed by the year 2010 within the Redlands Planning Area without exceeding the SCAG forecast. Since the Measure N cap on residential growth will limit the number of new residential dwellings within the Redlands Planning Area to 8800 new dwellings by the year 2010, the proposed General Plan will not exceed the 1994 AQMP assumptions regarding growth in residential uses in San Bernardino County.

The SCAG 2010 employment assumptions for the Redlands Planning Area include approximately 61,472 employees. Currently, there are 25,421 employees within the Planning Area; therefore 36,051 new jobs will be needed to achieve consistency with the SCAG 2010 forecast.

The proposed General Plan would provide up to 106,565 employment opportunities, based upon SCAG employment conversion factors (2.0 employees/TSF of commercial use, 2.5 employees/TSF of industrial use and 3.5 employees/TSF of office use). Consequently, to maintain consistency with the 61,472 employees projected by SCAG for 2010, an annual employment growth within the Redlands Planning Area cannot exceed 5.67 percent through the year 2010.

The *1994 Air Quality Management Plan* was based upon the population forecast developed by SCAG by county within the SCAB. That forecast included population estimates for San Bernardino County for 1990 (1,107,587) for 2000 (1,425,277) and for year 2010 conditions (1,730,685).[3] Based upon those projections, population growth within the County is expected to occur at an average annual rate of 2.26 percent, between 1990 and 2010. The annual population growth rate between 2000 and 2010 is somewhat lower (1.96 percent).

**City of Redlands General Plan**

The City of Redlands is currently in the process of addressing potential air quality issues through the development and adoption of General Plan objectives, policies and implementation programs. The implementation programs as well as applicable SCAQMD Rules and Regulations, commit the City to mitigation that will reduce construction-related and operational air quality impacts. The proposed General Plan contains objectives and policies regarding improvements to circulation which will be carried out through the TCM Ordinance and the development review process. The primary objective of these programs is reducing vehicle trips and vehicle miles traveled, thereby improving air quality.

The City's General Plan text responds to the AQMP control measures in the Health and Safety Element. The General Plan text reflects an implementation program for the core of the AQMP control measures: adoption of the Transportation Control Measures Ordinance, implementation of transit and rideshare (carpool, vanpool) programs and adoption of dust emissions controls. Once the proposed General Plan text is adopted, future development projects within the City of Redlands will be required to implement these programs.

### 3.5 Cumulative and Growth Inducing Effects

Since the possibility for significant short-term and long-term adverse air quality impacts (according to the SCAQMD threshold) could occur as a direct or indirect result of buildout of the proposed General Plan, project-related cumulative air quality impacts will also be significant. Any proposed future projects in the vicinity of the City of Redlands will, in conjunction with this project, exceed the SCAQMD "significant threshold criteria".

It is not possible to mitigate these impacts to a level of insignificance. Adherence to the SCAQMD Rules and Regulations and compliance with locally adopted AQMP control measures (in the form of General Plan text implementation programs) will help reduce the city-wide air pollutant burden. However, it is important that the growth pressure experienced in the San Bernardino Valley be monitored as a whole, so that attainment of the state and federal ambient air quality standards occurs as projected.

For purposes of the cumulative impact assessment, the DKS traffic study has identified unincorporated areas within the City Sphere of Influence as the cumulative impact area. Therefore, the proposed General Plan emissions inventory suffices as the cumulative emissions inventory. As noted therein, the proposed General Plan will exceed all SCAQMD significance thresholds. The Caline 4 analysis indicates that for the cumulative traffic volumes, the state and federal 1-hour and 8-hour carbon monoxide standards will not be exceeded.

## *4.0 AIR QUALITY MITIGATION MEASURES*

The impact analysis demonstrates that the Redlands General Plan update would generate significant construction-related, operational, and cumulative adverse air quality impacts, as defined by the SCAQMD. Consequently, mitigation measures are required to reduce these impacts. Table 4-1 includes a list of potential mitigation measures recommended by the SCAQMD for use as standard conditions of approval on all new projects within the Redlands Planning Area or for inclusion as General Plan policies, objectives or goals. Even with these mitigation measures, it would be virtually impossible to mitigate the adverse air quality impacts to a level of insignificance.

Since the study area is located in a basin that is a nonattainment area for ozone, CO, $NO_2$ and $PM_{10}$, any General Plan alternative which reduces air quality impacts should be given careful consideration. Moreover, the City of Redlands is currently addressing potential air quality impacts through General Plan objectives and policies (i.e. making a commitment to certain standard types of mitigation to reduce short-term and long-term impacts). The General Plan includes goals and objectives regarding improvements to circulation that will be carried out with the objective of improving local and regional air quality.

Table 4-1
Potential Mitigation Measures[a]

**Minimize Construction Activity Emissions:**

- Water site and clean equipment morning and evening.
- Spread soil binders on site, unpaved roads and parking areas.
- Reestablish ground cover on construction site through seeding and watering.
- Employ construction activity management techniques, such as: extending the construction period; reducing the number of pieces of equipment used simultaneously; increasing the distance between the emission sources; reducing or changing the hours of construction; and scheduling activity during off-peak hours.
- Pave construction roads, and sweep streets if silt is carried over to adjacent public thoroughfares.
- Require a phased-schedule for construction activities to minimize emissions.
- Suspend grading operations during first and second stage smog alerts.
- Wash off trucks leaving the site.
- Maintain construction equipment engines by keeping them tuned.
- Use low-sulfur fuel for equipment.
- Utilize existing power sources (i.e., temporary power poles) and avoid on-site power generation.

**Reduce Construction-Related Traffic Congestion:**

- Provide rideshare and transit incentives for construction personnel.
- Configure construction parking to minimize traffic interference.
- Minimize obstruction of through-traffic lanes.
- Provide a flagperson to guide traffic properly and ensure safety at construction sites.
- Schedule operations affecting traffic for off-peak hours.
- Develop a traffic plan to minimize traffic flow interference from construction activities. Plan may include advance public notice of routing, use of public transportation, and satellite parking areas with a shuttle service.

a. SCAQMD letter dated September 4, 1991 from Cindy S. Greenwald.

Table 4-1 (cont.)
Potential Mitigation Measures[a]

**Limit Emissions From Vehicle Trips:**

- Promote Transportation Management Associations (TMAs).
- Establish telecommuting programs, alternative work schedules, and satellite work centers.
- Schedule goods movements for off-peak traffic hours.
- Provide local shuttle and regional transit systems and transit shelters.
- Provide bicycle lanes, storage areas, and amenities, and ensure efficient parking management.
- Synchronize traffic signals.
- Provide dedicated turn lanes as appropriate.
- Work with cities/developers/citizens in the region to implement TDM goals.
- Provide peripheral park-n-ride lots.
- Provide preferential parking to high occupancy vehicles and shuttle services; and charge parking lot fees to low occupancy vehicles.
- Provide adequate ingress and egress at all entrances to public facilities to minimize vehicle idling at curbsides.
- Provide dedicated parking spaces with electrical outlets for electric vehicles.

**Minimize Indirect Source Emissions:**

- Implement energy conservation measures beyond state and local requirements.
- Install energy-efficient street lighting.
- Landscape with native drought-resistant species to reduce water consumption and to provide passive solar benefits.
- Provide incentives for solid waste recycling.

**Minimize Building Energy Requirements:**

- Improve the thermal integrity of buildings, and reduce the thermal load with automated time clocks or occupant sensors.
- Introduce window glazing, wall insulation, and efficient ventilation methods.
- Introduce efficient heating and other appliances, such as water heaters, cooking equipment, refrigerators, furnaces and boiler units.
- Incorporate appropriate passive solar design, and solar heaters.
- Use devices that minimize the combustion of fossil fuels.

**Minimize Potential Public Exposure to Toxic Air Emissions:**

- Capture waste heat and reemploy it in nonresidential buildings.
- Integrate additional mitigation measures into site design such as the creation of buffering areas between a potential sensitive receptor's boundary and potential pollution source.
- Require design features, operating procedures, preventive maintenance, operator training, and emergency response planning to prevent the release of toxic pollutants.

a. SCAQMD letter dated September 4, 1991 from Cindy S. Greenwald.

Table 4-1 (cont.)
Potential Mitigation Measures[a]

| |
|---|
| **Minimize Emissions Via General Plan Policies, Objectives and Goals:**<br>• Prepare a policy statement committing to improvements of circulation through the adoption of Trip Reduction Ordinances, development of TMA's, etc.<br>• Prepare mitigation for construction-related activities that will be included in the General Plan as good development practices.<br>• Prepare mitigation for operational-related activities that will be included in the General Plan as good development practices (i.e., develop design mitigation that maximizes energy conservation). |

a. SCAQMD letter dated September 4, 1991 from Cindy S. Greenwald.

The General Plan text includes objectives, policies and implementation programs that relate to air quality. Many of these policies and programs address the mitigation strategies outlined in Table 4-1 above. In addition, the City of Redlands has existing and pending programs that address many of the AQMP control measures. The City has adopted a Transportation Control Measures ordinance.

The inclusion of air quality policies and programs in the General Plan may serve as mitigation for the overall General Plan buildout scenario, if the policies contain specific goals and action dates. The SCAQMD encourages the adoption of specific standard mitigation measures, policy statements, objectives and goals either within Air Quality Elements or other elements of the General Plan to facilitate the attainment of federal and state ambient air quality standards. SCAQMD staff is available to assist in this endeavor.

# *Air Quality Appendix*

Ambient Air Quality Standards
Episode Criteria
Ambient Air Quality Data
Caline 4 Assumptions and Results
Field Office Stationary Source Emissions Worksheet
Construction Period Equipment Emissions Worksheet
Fugitive Dust Threshold Guidelines Worksheet
SCAQMD Rule 403
Energy Consumption Worksheets
Stationary Source Emissions Worksheet
Mobile Source Emissions Worksheets

# Ambient Air Quality Standards

| | California | | Federal | | |
|---|---|---|---|---|---|
| **Air Pollutant** | **Concentration** | **District Method** | **Primary (>)** | **Secondary (>)** | **Method** [a] |
| Ozone | 0.09 ppm, 1-hr. avg. >* | U.V. photometry | 0.12 ppm, 1-hr. avg. | 0.12 ppm, 1-hr. avg. | Chemiluminesence |
| Carbon Monoxide | 9.0 ppm, 8-hr. avg. > [b]<br>20 ppm, 1-hr. avg. > | Non-dispersive Infra-red Spectrophotometry | 9 ppm, 8-hr. avg. [e]<br>35 ppm, 1-hr. avg. | 9 ppm, 8-hr. avg.<br>35 ppm, 1-hr. avg. | Non-dispersive Infra-red Spectrophotometry |
| Nitrogen Dioxide | 0.25 ppm, 1-hr. avg. > [g] | Gas Phase Chemilluminescence | 0.053 ppm, ann. avg. [f] | 0.053 ppm, ann. avg. [f] | Gas Phase Chemiluminesence |
| Sulfur Dioxide | 0.04 ppm, 24-hr. avg. ><br>0.25 ppm, 1-hr. avg. > [c] | Ultraviolet Fluoresence | 0.03 ppm, ann. avg.<br>0.14 ppm, 24-hr. avg. | 0.50 ppm, 3-hr. avg. | Para-rosaniline |
| Suspended Partticulate Matter (PM10) | 30 $ug/m^3$, annual geometric mean ><br>50 $ug/m^3$, 24-hr. avg. > [d]** | Size Segregated Inlet High Volume Sampling | 50 $ug/m^3$, annual [h] arithmetic mean<br>150 $ug/m^3$, 24-hr. avg. | 50 $ug/m^3$, annual [h] arithmetic mean<br>150 $ug/m^3$, 24-hr. avg. | |
| Sulfates | 25 $ug/m^3$, 24-hr. avg. >= | High Vol. Sampling Methylthymol Blue | | | |
| Lead | 1.5 $ug/m^3$, 30-day avg. >= | High Vol. Sampling Methylthymol Blue | 1.5 $ug/m^3$, calendar quarter | 1.5 $ug/m^3$, calendar quarter | High Volume Sampling Atomic Absorption |
| Hydrogen Sulfide | 0.03 ppm, 1-hr. avg. >= | Cadmium Hydroxide Stractan | | | |
| Vinyl Chloride | 0.010 ppm, 24-hr. avg. >= | Gas Chromatography | | | |
| Visibility Reducing Particles | In sufficient amount to reduce the prevailing visibility to less than 10 miles at relative humidity less than 70%, 8-hr. avg. | | | | |

a) Reference method as described by the federal government. An equivalent method of measurement may be used as approved by the federal government.
b) Effective December 15, 1982. The standards were previously 10 ppm, (12-hour average) and 40 ppm, (1-hour average).
c) Effective October 5, 1984. The standard was previously .5 ppm, (1-hour average).
d) Effective August 19, l983. The standards were previously 60 $ug/m^3$ TSP, (annual geometric mean), and 100 $ug/m^3$TSP, (24-hour average).
e) Effective September 13, 1985, standard changed from > 10 $ug/m^3$ (>= 9.3 ppm) to > 9 ppm (>= 9.5 ppm).
f) Effective July 1, 1985, standard changed from > 100 $ug/m^3$ (> .0532 ppm) to > .053 ppm (> .0534 ppm).
g) Effective March 9, 1987, standard changed from >= .25 ppm to > .25 ppm.
h) Effective July 1, 1987. The standards were previously: Primary - Annual geometric mean TSP > 75 $ug/m^3$, and 24-hour average TSP > 260 $ug/m^3$. Secondary - Annual geometric mean TSP > 60 $ug/m^3$, and 24-hour average TSP > 150 $ug/m^3$.

* ppm = parts per million per volume
** $ug/m^3$ = micrograms per cubic meter.

Source: SCAQMD, Draft 1994 Air Quality Management Plan; Table 2-1, pg. 2-2.

# Episode Criteria

| Air Pollutant | SCAQMD and California | | | Federal | | |
|---|---|---|---|---|---|---|
| | Stage 1 | Stage 2 | Stage 3 | Stage 1 | Stage 2 | Stage 3 |
| Ozone | 0.20 ppm, 1-hr. avg. | 0.35 ppm, 1-hr. avg. | 0.50 ppm, 1-hr. avg. | - | - | 0.50 ppm, 1-hr. avg. |
| Carbon Monoxide | 40 ppm, 1-hr. avg.<br>20 ppm, 12-hr. avg. | 75 ppm, 1-hr. avg.<br>35 ppm, 12-hr. avg. | 100 ppm, 1-hr. avg.<br>50 ppm, 12-hr. avg. | 15 ppm, 8-hr. avg. | 30 ppm, 8-hr. avg. | 40 ppm, 8-hr. avg. |
| Nitrogen Dioxide | - | - | - | 0.60 ppm, 1-hr. avg.<br>0.15 ppm, 24-hr. avg. | 1.20 ppm, 1-hr. avg.<br>0.30 ppm, 24-hr. avg. | 1.60 ppm, 1-hr. avg.<br>0.40 ppm, 24-hr. avg. |
| Sulfur Dioxide | 0.50 ppm, 1-hr. avg.<br>0.20 ppm, 24-hr. avg. | 1.00 ppm, 1-hr. avg.<br>0.70 ppm, 24-hr. avg. | 2.00 ppm, 1-hr. avg.<br>0.90 ppm, 24-hr. avg. | - | - | - |
| Sulfur Dioxide/ Particulate Matter Combined | - | - | - | 65,000*, 24-hr. avg. | 261,000*, 24-hr. avg. | 393,000*, 24-hr. avg. |
| Particulate Matter | - | - | - | 375 ug/m$^3$, 24-hr. avg. | 625 ug/m$^3$, 24-hr. avg. | 875 ug/m$^3$, 24-hr. avg. |
| Sulfates** | 25 ug/m$^3$, 24-hr. avg. combined with ozone > 0.20 ppm, 1-hr. avg. | | | - | - | - |
| Actions to be taken | Health advisory to a) Persons with respiratory and coronary disease. b) School officials in order to curtail students' participation in strenuous activities. First steps in abatement plans. | Intermediate Stage. Abatement actions taken to reduce concentration of pollutant at issue. | Mandatory abatement measures. Extensive actions taken to prevent exposure at indicated levels. State can take action if local efforts failed. | Open burning prohibited. Reduction in vehicle operation requested. Industrial curtailment. | Incinerator use prohibited. Reduction in vehicle operation required. Further industrial curtailment. | Vehicle use prohibited. Industry shut down or curtailment. Public activities ceased. |

* Product of sulfur dioxide (ppm), particulate matter (ug/m$^3$) and a factor (2620).

** Episodes based upon these criteria are not classified according to stages.

Endo Engineering

Source: SCAQMD, 1983

CARB Air Quality Data for San Bernardino

| Pollutant | 1992 | 1993 | 1994 | Max Value | %Exceeded |
|---|---|---|---|---|---|
| **Carbon Monoxide** | | | | | |
| Maximum 8-Hour Conc. (ppm) | 5.9 | 6.0 | 6.5 | 6.5 | - |
| Days 8-Hour Conc. ≥9.5 ppm (Federal) | 0 | 0 | 0 | - | 0 |
| Days 8-Hour Conc. ≥9.1 ppm (State) | 0 | 0 | 0 | - | 0 |
| Maximum 1-Hour Conc. (ppm) | 7 | 7 | 9 | 9 | - |
| Days 1-Hour Conc. >20 ppm (State) | 0 | 0 | 0 | - | 0 |
| Days of Data | 366 | 364 | 365 | - | - |
| **Ozone** | | | | | |
| Maximum 1-Hour Conc. (ppm) | 0.28 | 0.21 | 0.25 | 0.28 | - |
| Days 1-Hour Conc. >0.12 ppm (Federal) | 85 | 65 | 96 | - | 22 |
| Days 1-Hour Conc. >0.09 ppm (State) | 141 | 132 | 132 | - | 37 |
| Days of Data | 366 | 365 | 365 | - | - |
| **Nitrogen Dioxide** | | | | | |
| AAM Conc. (ppm) (Federal) | 0.0356 | 0.0376 | 0.0411 | 0.0411 | - |
| % >0.0534 ppm (Federal) | 0 | 0 | 0 | - | 0 |
| Maximum 1-Hour Conc. (ppm) | 0.13 | 0.15 | 0.18 | 0.18 | - |
| Days 1-Hour Conc. >0.25 ppm (State) | 0 | 0 | 0 | - | 0 |
| Days of Data | 360 | 360 | 365 | - | - |
| **Sulfur Dioxide** | | | | | |
| Maximum 1-Hour Conc. (ppm) | 0.02 | 0.01 | 0.03 | 0.03 | - |
| Days 24-Hour Conc. >0.14 ppm (Federal) | 0 | 0 | 0 | - | 0 |
| Days 1-Hour Conc. >0.25 ppm (State) | 0 | 0 | 0 | - | 0 |
| Maximum 24-Hour Conc. (ppm) | 0.012 | 0.001 | 0.009 | 0.012 | - |
| Days 24-Hour Conc. >0.05 ppm (State) | 0 | 0 | 0 | - | 0 |
| Days of Data | 365 | 365 | 365 | - | - |
| **Suspended Particulate Matter (PM10)** | | | | | |
| Maximum 24-Hour Conc. (ug/m3) | 136 | 139 | 147 | 147 | - |
| 24-Hour Samples >150 ug/m3 (Federal) | 0 | 0 | 0 | - | 0 |
| 24-Hour Samples >50 ug/m3 (State) | 36 | 37 | 38 | - | 62 |
| AAM Conc. (ug/m3) (Federal) | 56.7 | 56.2 | 60.0 | 60.0 | - |
| Conc. >50 ug/m3 (Federal) | Yes | Yes | Yes | - | - |
| AGM Conc. (ug/m3) (State) | 48.7 | 47.6 | 52.7 | 52.7 | - |
| Conc. >30 ug/m3 (State) | Yes | Yes | Yes | - | - |
| Number of Samples | 60 | 59 | 60 | - | - |
| **Sulfate-State** | | | | | |
| Maximum 24-Hour Conc. (ug/m3) | 12.9 | 17.2 | 15.5 | 17.2 | - |
| % Samples 24-Hour Conc. >25.0 ug/m3 | 0 | 0 | 0 | - | 0.0 |
| **Visibility-State** | | | | | |
| Days Not Meeting Standard | 55 | 176 | 56 | - | 35 |
| Days of Data | 142 | 330 | 350 | - | - |

1. NM=Not Monitored. Shading=Less than 12 full months of data. May not be representative.
2. Data prior to 1992 reflects state standard of visibility <10 miles for hours with relative humidity <70%.

CARB Air Quality Data for Redlands

| Pollutant | 1992 | 1993 | 1994 | Max Value | %Exceeded |
|---|---|---|---|---|---|
| **Carbon Monoxide** | | | | | |
| Maximum 8-Hour Conc. (ppm) | NM | NM | NM | NM | - |
| Days 8-Hour Conc. ≥9.5 ppm (Federal) | NM | NM | NM | - | NM |
| Days 8-Hour Conc. ≥9.1 ppm (State) | NM | NM | NM | - | NM |
| Maximum 1-Hour Conc. (ppm) | NM | NM | NM | NM | - |
| Days 1-Hour Conc. >20 ppm (State) | NM | NM | NM | - | NM |
| Days of Data | NM | NM | NM | - | - |
| **Ozone** | | | | | |
| Maximum 1-Hour Conc. (ppm) | 0.27 | 0.27 | 0.23 | 0.27 | - |
| Days 1-Hour Conc. >0.12 ppm (Federal) | 103 | 95 | 98 | - | 27 |
| Days 1-Hour Conc. >0.09 ppm (State) | 159 | 160 | 140 | - | 42 |
| Days of Data | 366 | 365 | 365 | - | - |
| **Nitrogen Dioxide** | | | | | |
| AAM Conc. (ppm) (Federal) | NM | NM | NM | NM | - |
| % >0.0534 ppm (Federal) | NM | NM | NM | - | NM |
| Maximum 1-Hour Conc. (ppm) | NM | NM | NM | NM | - |
| Days 1-Hour Conc. >0.25 ppm (State) | NM | NM | NM | - | NM |
| Days of Data | NM | NM | NM | - | - |
| **Sulfur Dioxide** | | | | | |
| Maximum 1-Hour Conc. (ppm) | NM | NM | NM | NM | - |
| Days 24-Hour Conc. >0.14 ppm (Federal) | NM | NM | NM | - | NM |
| Days 1-Hour Conc. >0.25 ppm (State) | NM | NM | NM | - | NM |
| Maximum 24-Hour Conc. (ppm) | NM | NM | NM | NM | - |
| Days 24-Hour Conc. >0.05 ppm (State) | NM | NM | NM | - | NM |
| Days of Data | NM | NM | NM | - | - |
| **Suspended Particulate Matter (PM10)** | | | | | |
| Maximum 24-Hour Conc. (ug/m3) | NM | 109 | 138 | 138 | - |
| 24-Hour Samples >150 ug/m3 (Federal) | NM | 0 | 0 | - | 0 |
| 24-Hour Samples >50 ug/m3 (State) | NM | 25 | 24 | - | 43 |
| AAM Conc. (ug/m3) (Federal) | NM | 45.3 | 47.2 | NM | - |
| Conc. >50 ug/m3 (Federal) | NM | No | No | - | - |
| AGM Conc. (ug/m3) (State) | NM | 35.2 | 37.8 | NM | - |
| Conc. >30 ug/m3 (State) | NM | Yes | Yes | - | - |
| Number of Samples | NM | 54 | 59 | - | - |
| **Sulfate-State** | | | | | |
| Maximum 24-Hour Conc. (ug/m3) | NM | NM | NM | NM | - |
| % Samples 24-Hour Conc. >25.0 ug/m3 | NM | NM | NM | - | NM |
| **Visibility-State** | | | | | |
| Days Not Meeting Standard | NM | NM | NM | - | NM |
| Days of Data | NM | NM | NM | - | - |

1. NM=Not Monitored. Shading=Less than 12 full months of data. May not be representative.

## CARB Air Quality Data for Crestline

| Pollutant | 1992 | 1993 | 1994 | Max Value | %Exceeded |
|---|---|---|---|---|---|
| **Carbon Monoxide** | | | | | |
| Maximum 8-Hour Conc. (ppm) | NM | NM | NM | NM | - |
| Days 8-Hour Conc. ≥9.5 ppm (Federal) | NM | NM | NM | - | NM |
| Days 8-Hour Conc. ≥9.1 ppm (State) | NM | NM | NM | - | NM |
| Maximum 1-Hour Conc. (ppm) | NM | NM | NM | NM | - |
| Days 1-Hour Conc. >20 ppm (State) | NM | NM | NM | - | NM |
| Days of Data | NM | NM | NM | - | - |
| **Ozone** | | | | | |
| Maximum 1-Hour Conc. (ppm) | 0.28 | 0.24 | 0.27 | 0.28 | - |
| Days 1-Hour Conc. >0.12 ppm (Federal) | 103 | 88 | 107 | - | 27 |
| Days 1-Hour Conc. >0.09 ppm (State) | 160 | 144 | 147 | - | 41 |
| Days of Data | 366 | 365 | 364 | - | - |
| **Nitrogen Dioxide** | | | | | |
| AAM Conc. (ppm) (Federal) | NM | NM | NM | NM | - |
| % >0.0534 ppm (Federal) | NM | NM | NM | - | NM |
| Maximum 1-Hour Conc. (ppm) | NM | NM | NM | NM | - |
| Days 1-Hour Conc. >0.25 ppm (State) | NM | NM | NM | - | NM |
| Days of Data | NM | NM | NM | - | - |
| **Sulfur Dioxide** | | | | | |
| Maximum 1-Hour Conc. (ppm) | NM | NM | NM | NM | - |
| Days 24-Hour Conc. >0.14 ppm (Federal) | NM | NM | NM | - | NM |
| Days 1-Hour Conc. >0.25 ppm (State) | NM | NM | NM | - | NM |
| Maximum 24-Hour Conc. (ppm) | NM | NM | NM | NM | - |
| Days 24-Hour Conc. >0.05 ppm (State) | NM | NM | NM | - | NM |
| Days of Data | NM | NM | NM | - | - |
| **Suspended Particulate Matter (PM10)** | | | | | |
| Maximum 24-Hour Conc. (ug/m3) | NM | 73 | 67 | 73 | - |
| 24-Hour Samples >150 ug/m3 (Federal) | NM | 0 | 0 | - | 0 |
| 24-Hour Samples >50 ug/m3 (State) | NM | 2 | 3 | - | 5 |
| AAM Conc. (ug/m3) (Federal) | NM | 31.3 | 26.1 | NM | - |
| Conc. >50 ug/m3 (Federal) | NM | No | No | - | - |
| AGM Conc. (ug/m3) (State) | NM | 25.5 | 22.4 | NM | - |
| Conc. >30 ug/m3 (State) | NM | No | No | - | - |
| Number of Samples | NM | 50 | 60 | - | - |
| **Sulfate-State** | | | | | |
| Maximum 24-Hour Conc. (ug/m3) | NM | NM | NM | NM | - |
| % Samples 24-Hour Conc. >25.0 ug/m3 | NM | NM | NM | - | NM |
| **Visibility-State** | | | | | |
| Days Not Meeting Standard | NM | NM | NM | - | NM |
| Days of Data | NM | NM | NM | - | - |

1. NM=Not Monitored. Shading=Less than 12 full months of data. May not be representative.

# CALINE 4 Assumptions

Traffic Data -- was taken from DKS Associates Inc. Daily volumes were provided which reflect current and buildout conditions with the proposed General Plan.

Roadway Speeds -- 35 mph was assumed as the 1994 morning peak speed and 27 mph for 2015, as interpolated from Table A9-5-F in the SCAQMD *CEQA Air Quality Handbook*, April 1993. Refer to the calculated parameters at the top of the 1994 and 2015 Mobile Source Emission Inventory worksheets.

Meteorological Conditions -- included 0.5 mph winds, stability class G for one-hour values, a persistence factor of 0.86 for eight-hour values and wind directions determined by iterative runs of the computer model to insure that carbon monoxide concentrations are maximized (greatest concentration for the nearest receptor).

Highway Widths -- were derived for existing conditions from DKS Associates roadway cross-sections. Future cross-sections were based upon the master planned classifications. The widths included 3 meters per side as specified for the CALINE 4 model input.

Emission Factors -- were taken from SCAQMD *CEQA Air Quality Handbook*, April 1993. The 1994 CO emmission factor was 6.1 grams per mile (refer to the 1994 Mobile Source Emmission Inventory worksheet). The 2015 CO emission factor was 2.6 grams per mile (refer to 2015 Mobile Source Emission Inventory worksheet).

Background Concentrations-- for carbon monoxide were derived from ambient air quality data for 1992-1994 taken at the San Bernardino station. The highest concentrations were used.

REPORT FOR FILE : ERED_ALA

1. Site Variables

| | | | |
|---|---|---|---|
| U= | 0.5 M/S | ZO= | 100.0 CM |
| BRG= | 190.0 DEGREES | VD= | 0.0 CM/S |
| CLASS= | G STABILITY | VS= | 0.0 CM/S |
| MIXH= | 1000.0 M | AMB= | 0.0 PPM |
| SIGTH= | 20.0 DEGREES | TEMP= | 7.0 DEGREE (C) |

2. Link Description

| LINK DESCRIPTION | | * LINK COORDINATES (M) X1 | Y1 | X2 | Y2 | * TYPE | VPH | EF (G/MI) | H (M) | W (M) |
|---|---|---|---|---|---|---|---|---|---|---|
| A. ALABAMA | NL | 300 | 300 | 300 | 600 | AG | 2730 | 6.1 | 0.0 | 30.0 |
| B. ALABAMA | SL | 300 | 300 | 300 | 0 | AG | 2080 | 6.1 | 0.0 | 30.0 |
| C. REDLANDS | EL | 300 | 300 | 600 | 300 | AG | 2070 | 6.1 | 0.0 | 30.0 |
| D. REDLANDS | WL | 300 | 300 | 0 | 300 | AG | 2390 | 6.1 | 0.0 | 30.0 |

| LINK | * MIXW L (M) | R (M) | STPL (M) | DCLT (SEC) | ACCT (SEC) | SPD (MPH) | NCYC | NDLA | VPHO | EFI (G/MIN) | IDT1 (SEC) | IDT2 (SEC) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| B. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| C. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| D. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |

3. Receptor Coordinates

| | X | Y | Z |
|---|---|---|---|
| RECEPTOR 1 | 285 | 285 | 1.3 |
| RECEPTOR 2 | 270 | 270 | 1.3 |
| RECEPTOR 3 | 254 | 254 | 1.3 |
| RECEPTOR 4 | 239 | 239 | 1.3 |

| RECEPTOR | * PRED CONC (PPM) | * WIND BRG (DEG) * | CONC/LINK (PPM) A | B | C | D |
|---|---|---|---|---|---|---|
| RECEPT 1 | 2.9 | 12 | 1.0 | 1.2 | 0.0 | 0.7 |
| RECEPT 2 | 1.1 | 16 | 0.6 | 0.0 | 0.0 | 0.4 |
| RECEPT 3 | 0.8 | 22 | 0.5 | 0.0 | 0.0 | 0.3 |
| RECEPT 4 | 0.7 | 26 | 0.4 | 0.0 | 0.0 | 0.3 |

REPORT FOR FILE : ERED_ORA

## 1. Site Variables

| | | | |
|---|---|---|---|
| U= | 0.5 M/S | ZO= | 100.0 CM |
| BRG= | 190.0 DEGREES | VD= | 0.0 CM/S |
| CLASS= | G STABILITY | VS= | 0.0 CM/S |
| MIXH= | 1000.0 M | AMB= | 0.0 PPM |
| SIGTH= | 20.0 DEGREES | TEMP= | 7.0 DEGREE (C) |

## 2. Link Description

| LINK DESCRIPTION | * | LINK COORDINATES (M) X1 | Y1 | X2 | Y2 | * | TYPE | VPH | EF (G/MI) | H (M) | W (M) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A. ORANGE ST NL | | 300 | 300 | 300 | 600 | | AG | 2230 | 6.1 | 0.0 | 30.0 |
| B. ORANGE ST SL | | 300 | 300 | 300 | 0 | | AG | 2230 | 6.1 | 0.0 | 30.0 |
| C. BELLANDS EL | | 300 | 300 | 600 | 300 | | AG | 2200 | 6.1 | 0.0 | 30.0 |
| D. BELLANDS WL | | 300 | 300 | 0 | 300 | | AG | 1620 | 6.1 | 0.0 | 30.0 |

| LINK | * | MIXW L (M) | R (M) | STPL (M) | DCLT (SEC) | ACCT (SEC) | SPD (MPH) | NCYC | NDLA | VPHO | EFI (G/MIN) | IDT1 (SEC) | IDT2 (SEC) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A. | | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| B. | | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| C. | | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| D. | | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |

## 3. Receptor Coordinates

| | X | Y | Z |
|---|---|---|---|
| RECEPTOR 1 | 315 | 285 | 1.3 |
| RECEPTOR 2 | 330 | 270 | 1.3 |
| RECEPTOR 3 | 346 | 254 | 1.3 |
| RECEPTOR 4 | 361 | 239 | 1.3 |

| RECEPTOR | * | PRED CONC (PPM) | * | WIND BRG (DEG) | * | COCN/LINK (PPM) A | B | C | D |
|---|---|---|---|---|---|---|---|---|---|
| RECPT 1 | * | 2.4 | * | 345 | * | 0.8 | 1.0 | 0.6 | 0.0 |
| RECPT 2 | * | 1.0 | * | 344 | * | 0.5 | 0.0 | 0.4 | 0.0 |
| RECPT 3 | * | 0.7 | * | 338 | * | 0.4 | 0.0 | 0.3 | 0.0 |
| RECPT 4 | * | 0.6 | * | 334 | * | 0.3 | 0.0 | 0.3 | 0.0 |

REPORT FOR FILE : EALA_LUG

## 1. Site Variables

| | | | |
|---|---|---|---|
| U= | 0.5 M/S | ZO= | 100.0 CM |
| BRG= | 190.0 DEGREES | VD= | 0.0 CM/S |
| CLASS= | G STABILITY | VS= | 0.0 CM/S |
| MIXH= | 1000.0 M | AMB= | 0.0 PPM |
| SIGTH= | 20.0 DEGREES | TEMP= | 7.0 DEGREE (C) |

## 2. Link Description

| LINK DESCRIPTION | LINK COORDINATES (M) X1 | Y1 | X2 | Y2 | TYPE | VPH | EF (G/MI) | H (M) | W (M) |
|---|---|---|---|---|---|---|---|---|---|
| A. ALABAMA NL | 300 | 300 | 300 | 600 | AG | 1450 | 6.1 | 0.0 | 30.0 |
| B. ALABAMA SL | 300 | 300 | 300 | 0 | AG | 1010 | 6.1 | 0.0 | 30.0 |
| C. LUGONIA A EL | 300 | 300 | 600 | 300 | AG | 730 | 6.1 | 0.0 | 18.0 |
| D. LUGONIA A WL | 300 | 300 | 0 | 300 | AG | 400 | 6.1 | 0.0 | 18.0 |

| LINK | MIXW L (M) | R (M) | STPL (M) | DCLT (SEC) | ACCT (SEC) | SPD (MPH) | NCYC | NDLA | VPHO | EFI (G/MIN) | IDT1 (SEC) | IDT2 (SEC) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| B. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| C. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| D. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |

## 3. Receptor Coordinates

| | X | Y | Z |
|---|---|---|---|
| RECEPTOR 1 | 315 | 285 | 1.3 |
| RECEPTOR 2 | 330 | 270 | 1.3 |
| RECEPTOR 3 | 346 | 254 | 1.3 |
| RECEPTOR 4 | 361 | 239 | 1.3 |

| RECEPTOR | PRED CONC (PPM) | WIND BRG (DEG) | COCN/LINK (PPM) A | B | C | D |
|---|---|---|---|---|---|---|
| RECPT 1 | 1.2 | 345 | 0.5 | 0.4 | 0.2 | 0.0 |
| RECPT 2 | 0.5 | 345 | 0.4 | 0.0 | 0.1 | 0.0 |
| RECPT 3 | 0.4 | 341 | 0.3 | 0.0 | 0.1 | 0.0 |
| RECPT 4 | 0.3 | 336 | 0.2 | 0.0 | 0.1 | 0.0 |

REPORT FOR FILE : ELUG_ORA

1. Site Variables

```
     U=    0.5 M/S              Z0=  100.0  CM
   BRG=  190.0 DEGREES          VD=    0.0 CM/S
 CLASS=    G  STABILITY         VS=    0.0 CM/S
  MIXH= 1000.0 M               AMB=    0.0 PPM
 SIGTH=   20.0 DEGREES        TEMP=    7.0 DEGREE (C)
```

2. Link Description

| LINK DESCRIPTION | X1 | Y1 | X2 | Y2 | TYPE | VPH | EF (G/MI) | H (M) | W (M) |
|---|---|---|---|---|---|---|---|---|---|
| A. ORANGE ST NL | 300 | 300 | 300 | 600 | AG | 670 | 6.1 | 0.0 | 18.0 |
| B. ORANGE ST SL | 300 | 300 | 300 | 0 | AG | 1560 | 6.1 | 0.0 | 26.0 |
| C. LUGONIA A EL | 300 | 300 | 600 | 300 | AG | 1240 | 6.1 | 0.0 | 26.0 |
| D. LUGONIA A WL | 300 | 300 | 0 | 300 | AG | 1240 | 6.1 | 0.0 | 18.0 |

| LINK | MIXW L (M) | MIXW R (M) | STPL (M) | DCLT (SEC) | ACCT (SEC) | SPD (MPH) | NCYC | NDLA | VPHO | EFI (G/MIN) | IDT1 (SEC) | IDT2 (SEC) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| B | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| C | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| D | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |

3. Receptor Coordinates

| | X | Y | Z |
|---|---|---|---|
| RECEPTOR 1 | 315 | 315 | 1.3 |
| RECEPTOR 2 | 330 | 330 | 1.3 |
| RECEPTOR 3 | 346 | 346 | 1.3 |
| RECEPTOR 4 | 361 | 361 | 1.3 |

| RECEPTOR | PRED CONC (PPM) | WIND BRG (DEG) | COCN/LINK (PPM) A | B | C | D |
|---|---|---|---|---|---|---|
| RECPT 1 | 1.0 | 190 | 0.0 | 0.6 | 0.4 | 0.0 |
| RECPT 2 | 0.6 | 196 | 0.0 | 0.4 | 0.2 | 0.0 |
| RECPT 3 | 0.5 | 200 | 0.0 | 0.3 | 0.2 | 0.0 |
| RECPT 4 | 0.4 | 203 | 0.0 | 0.2 | 0.2 | 0.0 |

REPORT FOR FILE : ECIT_JUD

## 1. Site Variables

| | | | |
|---|---|---|---|
| U= | 0.5 M/S | ZO= | 100.0 CM |
| BRG= | 190.0 DEGREES | VD= | 0.0 CM/S |
| CLASS= | G STABILITY | VS= | 0.0 CM/S |
| MIXH= | 1000.0 M | AMB= | 0.0 PPM |
| SIGTH= | 20.0 DEGREES | TEMP= | 7.0 DEGREE (C) |

## 2. Link Description

| LINK DESCRIPTION | * | LINK COORDINATES (M) X1 | Y1 | X2 | Y2 | * | TYPE | VPH | EF (G/MI) | H (M) | W (M) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. JUDSON ST NL | | 300 | 300 | 300 | 600 | | AG | 950 | 6.1 | 0.0 | 18.0 |
| 2. FORD ST SL | | 300 | 300 | 300 | 0 | | AG | 730 | 6.1 | 0.0 | 18.0 |
| 3. CITRUS AV EL | | 300 | 300 | 600 | 300 | | AG | 1620 | 6.1 | 0.0 | 26.0 |
| 4. CITRUS AV WL | | 300 | 300 | 0 | 300 | | AG | 1260 | 6.1 | 0.0 | 26.0 |

| LINK | * | MIXW L (M) | MIXW R (M) | STPL (M) | DCLT (SEC) | ACCT (SEC) | SPD (MPH) | NCYC | NDLA | VPHO | EFI (G/MIN) | IDT1 (SEC) | IDT2 (SEC) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| 2. | | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| 3. | | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| 4. | | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |

## 3. Receptor Coordinates

| | X | Y | Z |
|---|---|---|---|
| RECEPTOR 1 | 285 | 315 | 1.3 |
| RECEPTOR 2 | 270 | 330 | 1.3 |
| RECEPTOR 3 | 254 | 346 | 1.3 |
| RECEPTOR 4 | 239 | 361 | 1.3 |

| RECEPTOR | * | PRED CONC (PPM) | * | WIND BRG (DEG) | * | COCN/LINK (PPM) A | B | C | D |
|---|---|---|---|---|---|---|---|---|---|
| RECPT 1 | * | 1.0 | * | 101 | * | 0.3 | 0.0 | 0.6 | 0.1 |
| RECPT 2 | * | 0.6 | * | 106 | * | 0.2 | 0.0 | 0.4 | 0.0 |
| RECPT 3 | * | 0.5 | * | 113 | * | 0.1 | 0.0 | 0.3 | 0.0 |
| RECPT 4 | * | 0.4 | * | 116 | * | 0.1 | 0.0 | 0.2 | 0.0 |

REPORT FOR FILE : FRED_ALA

## 1. Site Variables

| | | | |
|---|---|---|---|
| U= | 0.5 M/S | ZO= | 100.0 CM |
| BRG= | 190.0 DEGREES | VD= | 0.0 CM/S |
| CLASS= | G STABILITY | VS= | 0.0 CM/S |
| MIXH= | 1000.0 M | AMB= | 0.0 PPM |
| SIGTH= | 20.0 DEGREES | TEMP= | 7.0 DEGREE (C) |

## 2. Link Description

| LINK DESCRIPTION | | LINK COORDINATES (M) X1 | Y1 | X2 | Y2 | TYPE | VPH | EF (G/MI) | H (M) | W (M) |
|---|---|---|---|---|---|---|---|---|---|---|
| A. ALABAMA | NL | 300 | 300 | 300 | 600 | AG | 4990 | 2.6 | 0.0 | 38.0 |
| B. ALABAMA | SL | 300 | 300 | 300 | 0 | AG | 3720 | 2.6 | 0.0 | 38.0 |
| C. REDLANDS | EL | 300 | 300 | 600 | 300 | AG | 5310 | 2.6 | 0.0 | 38.0 |
| D. REDLANDS | WL | 300 | 300 | 0 | 300 | AG | 3450 | 2.6 | 0.0 | 38.0 |

| LINK | MIXW L (M) | MIXW R (M) | STPL (M) | DCLT (SEC) | ACCT (SEC) | SPD (MPH) | NCYC | NDLA | VPHO | EFI (G/MIN) | IDT1 (SEC) | IDT2 (SEC) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| B. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| C. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| D. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |

## 3. Receptor Coordinates

| | X | Y | Z |
|---|---|---|---|
| RECEPTOR 1 | 315 | 285 | 1.3 |
| RECEPTOR 2 | 330 | 270 | 1.3 |
| RECEPTOR 3 | 346 | 254 | 1.3 |
| RECEPTOR 4 | 361 | 239 | 1.3 |

| RECEPTOR | PRED CONC (PPM) | WIND BRG (DEG) | COCN/LINK (PPM) A | B | C | D |
|---|---|---|---|---|---|---|
| RECPT 1 | 1.3 | 354 | 0.7 | 0.1 | 0.5 | 0.0 |
| RECPT 2 | 0.9 | 342 | 0.4 | 0.0 | 0.4 | 0.0 |
| RECPT 3 | 0.6 | 339 | 0.3 | 0.0 | 0.3 | 0.0 |
| RECPT 4 | 0.5 | 336 | 0.3 | 0.0 | 0.2 | 0.0 |

REPORT FOR FILE : ERED_ORA

## 1. Site Variables

| | | | |
|---|---|---|---|
| U= | 0.5 M/S | ZO= | 100.0 CM |
| BRG= | 190.0 DEGREES | VD= | 0.0 CM/S |
| CLASS= | G STABILITY | VS= | 0.0 CM/S |
| MIXH= | 1000.0 M | AMB= | 0.0 PPM |
| SIGTH= | 20.0 DEGREES | TEMP= | 7.0 DEGREE (C) |

## 2. Link Description

| LINK DESCRIPTION | X1 | Y1 | X2 | Y2 | TYPE | VPH | EF (G/MI) | H (M) | W (M) |
|---|---|---|---|---|---|---|---|---|---|
| A. ORANGE ST NL | 300 | 300 | 300 | 600 | AG | 1550 | 2.6 | 0.0 | 30.0 |
| B. ORANGE ST SL | 300 | 300 | 300 | 0 | AG | 1910 | 2.6 | 0.0 | 30.0 |
| C. REDLANDS EL | 300 | 300 | 600 | 300 | AG | 2970 | 2.6 | 0.0 | 30.0 |
| D. REDLANDS WL | 300 | 300 | 0 | 300 | AG | 2950 | 2.6 | 0.0 | 30.0 |

| LINK | MIXW L (M) | MIXW R (M) | STPL (M) | DCLT (SEC) | ACCT (SEC) | SPD (MPH) | NCYC | NDLA | VPHO | EFI (G/MIN) | IDT1 (SEC) | IDT2 (SEC) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| B. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| C. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| D. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |

## 3. Receptor Coordinates

| | X | Y | Z |
|---|---|---|---|
| RECEPTOR 1 | 285 | 285 | 1.3 |
| RECEPTOR 2 | 270 | 270 | 1.3 |
| RECEPTOR 3 | 254 | 254 | 1.3 |
| RECEPTOR 4 | 239 | 239 | 1.3 |

| RECEPTOR | PRED CONC (PPM) | WIND BRG (DEG) | COCN/LINK (PPM) A | B | C | D |
|---|---|---|---|---|---|---|
| RECPT 1 | 1.4 | 78 | 0.0 | 0.2 | 0.4 | 0.7 |
| RECPT 2 | 0.5 | 71 | 0.0 | 0.1 | 0.3 | 0.0 |
| RECPT 3 | 0.3 | 66 | 0.0 | 0.1 | 0.2 | 0.0 |
| RECPT 4 | 0.3 | 64 | 0.0 | 0.1 | 0.2 | 0.0 |

REPORT FOR FILE : FALA_LUG

## 1. Site Variables

| | | | |
|---|---|---|---|
| U= | 0.5 M/S | ZO= | 100.0 CM |
| BRG= | 190.0 DEGREES | VD= | 0.0 CM/S |
| CLASS= | G STABILITY | VS= | 0.0 CM/S |
| MIXH= | 1000.0 M | AMB= | 0.0 PPM |
| SIGTH= | 20.0 DEGREES | TEMP= | 7.0 DEGREE (C) |

## 2. Link Description

| LINK DESCRIPTION | LINK COORDINATES (M) X1 | Y1 | X2 | Y2 | TYPE | VPH | EF (G/MI) | H (M) | W (M) |
|---|---|---|---|---|---|---|---|---|---|
| A. ALABAMA NL | 300 | 300 | 300 | 600 | AG | 5770 | 2.6 | 0.0 | 38.0 |
| B. ALABAMA SL | 300 | 300 | 300 | 0 | AG | 5310 | 2.6 | 0.0 | 38.0 |
| C. LUGONIA A EL | 300 | 300 | 600 | 300 | AG | 3230 | 2.6 | 0.0 | 30.0 |
| D. LUGONIA A WL | 300 | 300 | 0 | 300 | AG | 2160 | 2.6 | 0.0 | 30.0 |

| LINK | MIXW L (M) | R (M) | STPL (M) | DCLT (SEC) | ACCT (SEC) | SPD (MPH) | NCYC | NDLA | VPHO | EFI (G/MIN) | IDT1 (SEC) | IDT2 (SEC) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| B. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| C. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| D. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |

## 3. Receptor Coordinates

| | X | Y | Z |
|---|---|---|---|
| RECEPTOR 1 | 315 | 285 | 1.3 |
| RECEPTOR 2 | 330 | 270 | 1.3 |
| RECEPTOR 3 | 346 | 254 | 1.3 |
| RECEPTOR 4 | 361 | 239 | 1.3 |

| RECEPTOR | PRED CONC (PPM) | WIND BRG (DEG) | COCN/LINK (PPM) A | B | C | D |
|---|---|---|---|---|---|---|
| RECPT 1 | 1.4 | 354 | 0.8 | 0.2 | 0.4 | 0.0 |
| RECPT 2 | 0.8 | 342 | 0.5 | 0.1 | 0.2 | 0.0 |
| RECPT 3 | 0.6 | 339 | 0.4 | 0.0 | 0.2 | 0.0 |
| RECPT 4 | 0.5 | 336 | 0.3 | 0.0 | 0.2 | 0.0 |

REPORT FOR FILE : FLUG_ORA

1. Site Variables

| | | | |
|---|---|---|---|
| U= | 0.5 M/S | ZO= | 100.0 CM |
| BRG= | 190.0 DEGREES | VD= | 0.0 CM/S |
| CLASS= | G STABILITY | VS= | 0.0 CM/S |
| MIXH= | 1000.0 M | AMB= | 0.0 PPM |
| SIGTH= | 20.0 DEGREES | TEMP= | 7.0 DEGREE (C) |

2. Link Description

| LINK DESCRIPTION | * | LINK COORDINATES (M) X1 | Y1 | X2 | Y2 | * TYPE | VPH | EF (G/MI) | H (M) | W (M) |
|---|---|---|---|---|---|---|---|---|---|---|
| A. ORANGE ST NL | | 300 | 300 | 300 | 600 | AG | 2060 | 2.6 | 0.0 | 26.0 |
| B. ORANGE ST SL | | 300 | 300 | 300 | 0 | AG | 2660 | 2.6 | 0.0 | 26.0 |
| C. LUGONIA A EL | | 300 | 300 | 600 | 300 | AG | 2240 | 2.6 | 0.0 | 26.0 |
| D. LUGONIA A WL | | 300 | 300 | 0 | 300 | AG | 3290 | 2.6 | 0.0 | 30.0 |

| LINK | * MIXW L (M) | R (M) | STPL (M) | DCLT (SEC) | ACCT (SEC) | SPD (MPH) | NCYC | NDLA | VPHO | EFI (G/MIN) | IDT1 (SEC) | IDT2 (SEC) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| B. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| C. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| D. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |

3. Receptor Coordinates

| | X | Y | Z |
|---|---|---|---|
| RECEPTOR 1 | 315 | 285 | 1.3 |
| RECEPTOR 2 | 330 | 270 | 1.3 |
| RECEPTOR 3 | 346 | 254 | 1.3 |
| RECEPTOR 4 | 361 | 239 | 1.3 |

| RECEPTOR | * PRED CONC (PPM) | * WIND BRG (DEG) * | COCN/LINK (PPM) A | B | C | D |
|---|---|---|---|---|---|---|
| RECPT 1 * | 0.9 | * 281 * | 0.0 | 0.3 | 0.1 | 0.5 |
| RECPT 2 * | 0.5 | * 286 * | 0.0 | 0.2 | 0.0 | 0.3 |
| RECPT 3 * | 0.4 | * 292 * | 0.0 | 0.2 | 0.0 | 0.2 |
| RECPT 4 * | 0.3 | * 296 * | 0.0 | 0.1 | 0.0 | 0.2 |

REPORT FOR FILE : FCIT_JUD

## 1. Site Variables

| | | | |
|---|---|---|---|
| U= | 0.5 M/S | Z0= | 100.0 CM |
| BRG= | 190.0 DEGREES | VD= | 0.0 CM/S |
| CLASS= | G STABILITY | VS= | 0.0 CM/S |
| MIXH= | 1000.0 M | AMB= | 0.0 PPM |
| SIGTH= | 20.0 DEGREES | TEMP= | 7.0 DEGREE (C) |

## 2. Link Description

| LINK DESCRIPTION | X1 (M) | Y1 (M) | X2 (M) | Y2 (M) | TYPE | VPH | EF (G/MI) | H (M) | W (M) |
|---|---|---|---|---|---|---|---|---|---|
| A. JUDSON ST NL | 300 | 300 | 300 | 600 | AG | 1020 | 2.6 | 0.0 | 18.0 |
| B. FORD ST SL | 300 | 300 | 300 | 0 | AG | 710 | 2.6 | 0.0 | 18.0 |
| C. CITRUS AV EL | 300 | 300 | 600 | 300 | AG | 1410 | 2.6 | 0.0 | 26.0 |
| D. CITRUS AV WL | 300 | 300 | 0 | 300 | AG | 2080 | 2.6 | 0.0 | 26.0 |

| LINK | MIXW L (M) | MIXW R (M) | STPL (M) | DCLT (SEC) | ACCT (SEC) | SPD (MPH) | NCYC | NDLA | VPHO | EFI (G/MIN) | IDT1 (SEC) | IDT2 (SEC) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| B. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| C. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| D. | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |

## 3. Receptor Coordinates

| | X | Y | Z |
|---|---|---|---|
| RECEPTOR 1 | 315 | 315 | 1.3 |
| RECEPTOR 2 | 330 | 330 | 1.3 |
| RECEPTOR 3 | 346 | 346 | 1.3 |
| RECEPTOR 4 | 361 | 361 | 1.3 |

| RECEPTOR | PRED CONC (PPM) | WIND BRG (DEG) | COCN/LINK (PPM) A | B | C | D |
|---|---|---|---|---|---|---|
| RECPT 1 | 0.5 | 259 | 0.1 | 0.0 | 0.0 | 0.3 |
| RECPT 2 | 0.3 | 254 | 0.1 | 0.0 | 0.0 | 0.2 |
| RECPT 3 | 0.2 | 247 | 0.1 | 0.0 | 0.0 | 0.2 |
| RECPT 4 | 0.2 | 244 | 0.1 | 0.0 | 0.0 | 0.1 |

## Field Office Stationary Source Emission Worksheet

| Land Use | Floor Area | Electric Usage Rate (KwH/S.F./Yr) | Electrical Use (KwH/Yr) | Electrical Use (KwH/Day) | Air Pollutant | Emission Factor (Lbs./KwH) | Electric Emissions (Lbs./Day) |
|---|---|---|---|---|---|---|---|
| **Field Office** | 1,000 SF | 12.95 | 12,950 | 52 | CO | 0.00020 | **0.01036** |
| | | | | | ROG | 0.00001 | **0.00052** |
| | | | | | NOx | 0.00115 | **0.05957** |
| | | | | | SOx | 0.00012 | **0.00622** |
| | | | | | TSP | 0.00004 | **0.00207** |

Notes: 1. Power plant emission factors are from SCAQMD "CEQA Air Quality Handbook", 4/93.
2. Assumes 250 working days per year.

Construction Period Equipment Emissions Worksheet

| Vacant Acreage | Horsepower-Hours Per Acre Developed | Air Pollutant | Misc. Equip. Emis. Rate (Grams/Hphr) | Total Emissions (Pounds) | Total Emissions (Tons) |
|---|---|---|---|---|---|
| 1 | 250,000 | CO | 4.600 | 2,533 | 1.27 |
| | | ROG | 1.010 | 556 | 0.28 |
| | | NOx | 11.010 | 6,063 | 3.03 |
| | | SOx | 0.932 | 513 | 0.26 |
| | | TSP | 0.902 | 497 | 0.25 |

**NOTES:** 1. Emission Factors - Miscellaneous Emission Factors for Heavy Duty Diesel-Powered Construction Equipment given in terms of grams per horsepower-hours in AP-42 (EPA).

Construction Period Equipment Emissions Worksheet

| Vacant Acreage | Horsepower-Hours Per Acre Developed | Air Pollutant | Misc. Equip. Emis. Rate (Grams/Hphr) | Total Emissions (Pounds) | Total Emissions (Tons) |
|---|---|---|---|---|---|
| 2 | 250,000 | CO | 4.600 | 5,066 | 2.53 |
| | | ROG | 1.010 | 1,112 | 0.56 |
| | | NOx | 11.010 | 12,126 | 6.06 |
| | | SOx | 0.932 | 1,026 | 0.51 |
| | | TSP | 0.902 | 993 | 0.50 |

**NOTES:** 1. Emission Factors - Miscellaneous Emission Factors for Heavy Duty Diesel-Powered Construction Equipment given in terms of grams per horsepower-hours in AP-42 (EPA).
2. Acres developed per Day = 4.3 acres = 10,486 vacant acres/(20 years*260 days/year).

Construction Period Equipment Emissions Worksheet

| Vacant Acreage | Horsepower-Hours Per Acre Developed | Air Pollutant | Misc. Equip. Emis. Rate (Grams/Hphr) | Total Emissions (Pounds) | Total Emissions (Tons) |
|---|---|---|---|---|---|
| 10,486 | 250,000 | CO | 4.600 | 26,561,454 | 13,281 |
| | | ROG | 1.010 | 5,831,971 | 2,916 |
| | | NOx | 11.010 | 63,574,262 | 31,787 |
| | | SOx | 0.932 | 5,381,581 | 2,691 |
| | | TSP | 0.902 | 5,208,355 | 2,604 |

**NOTES:** 1. Acreage of Vacant Land to be Developed Provided by Smith Peroni & Fox (6/23/95)
2. Emission Factors - Miscellaneous Emission Factors for Heavy Duty Diesel-Powered Construction Equipment given in terms of grams per horsepower-hours in AP-42 (EPA).

# Fugitive Dust Threshold Guidelines Worksheet

| Pollutant | SCAQMD Threshold (Lbs/Day) | Pounds per Acre Disturbed Per day | Number of Acres per Day That Can be Disturbed Without Exceeding SCAQMD Threshold | |
|---|---|---|---|---|
| | | | Without Watering | With Watering |
| PM10 | 150 | 26.4 | 5.68 | 11.36 |

**Notes:** 1. Acres disturbed per month is number of acres disturbed per day x 21.5 working days per month.
2. TSP emission factor (1.2 tons/acre disturbed/month) is from EPA "Compilation of Air Pollution Emission Factors Vol. I", AP-42, September 1985 or 110 lbs./acre/day from the SCAQMD, "Air Quality Handbook" 1987.
3. PM10 emission factor (0.31 tons/acre disturbed/month or 28.8 lbs./acre disturbed/day) is from SCAQMD CEQA Air Quality Handbook; 11/93; Table A9-9 pg. A9-93.
4. Twice daily watering reduces fugitive dust emissions by approximately 50% (per EPA, AP-42).

RULE 403 - FUGITIVE DUST

(a) Purpose
The purpose of this rule is to reduce the amount of particulate matter entrained in the ambient air as a result of anthropogenic (man-made) fugitive dust sources by requiring actions to prevent, reduce or mitigate particulate matter emissions.

(b) Applicability
The provisions of this rule shall apply to any activity or man-made condition capable of generating fugitive dust.

(c) Definitions

(1) ACTIVE OPERATIONS shall mean any activity capable of generating fugitive dust, including, but not limited to, earth-moving activities, construction/demolition activities, or heavy- and light-duty vehicular movement.

(2) ANEMOMETERS are devices used to measure wind speed and direction in accordance with the performance standards, and maintenance and calibration criteria specified in the District's Rule 403 Implementation Handbook, dated September 1992.

(3) BULK MATERIAL is sand, gravel, soil, aggregate and other organic or inorganic particulate matter.

(4) CALENDAR QUARTER means a consecutive three-month period and each consecutive three-month period thereafter beginning on the first day of the calendar month in which an activity qualifies as a large operation.

(5) CONSTRUCTION/DEMOLITION ACTIVITIES are any on-site mechanical activities preparatory to or related to the building, alteration, rehabilitation, demolition or improvement of property, including, but not limited to the following activities; grading, excavation, loading, crushing, cutting, planing, shaping or ground breaking.

(6) CONTRACTOR means any person who has a contractual arrangement to conduct an active operation for another person.

(7) DISTURBED SURFACE AREA means a portion of the earth's surface which has been physically moved, uncovered, destabilized, or otherwise





modified from its undisturbed natural soil condition, thereby increasing the potential for emission of fugitive dust. This definition excludes those areas restored to a natural state, such that the vegetative ground cover and soil characteristics are similar to adjacent or nearby natural conditions.

(8) DUST SUPPRESSANTS are water, hygroscopic materials, or non-toxic chemical stabilizers used as a treatment material to reduce fugitive dust emissions. Non-toxic chemical stabilizers must not be used if prohibited for use by the Regional Water Quality Control Boards, the California Air Resources Board, the Environmental Protection Agency, or any applicable law, rule or regulation; and should meet any specifications, criteria, or tests required by any federal, state, or local water agency.

(9) EARTH-MOVING ACTIVITIES shall include, but not be limited to, grading, earth cutting and filling operations, loading or unloading of dirt or bulk materials, adding to or removing from open storage piles of bulk materials, landfill operations, or soil mulching.

(10) FUGITIVE DUST means any solid particulate matter that becomes airborne, other than that emitted from an exhaust stack, directly or indirectly as a result of the activities of man.

(11) INACTIVE DISTURBED SURFACE AREA means any disturbed surface area upon which active operations have not occurred for a period of ten consecutive days.

(12) LARGE OPERATIONS means any active operations on property which contains in excess of 100 acres of disturbed surface area; or any earth-moving operation which exceeds a daily earth-moving or throughput volume of 7,700 cubic meters (10,000 cubic yards) three times during the most recent 365-day period.

(13) NON-ROUTINE means any non-periodic active operation which occurs no more than three times per year, lasts less than 30 cumulative days per year, and is scheduled less than 30 days in advance.

(14) OPEN STORAGE PILE is any accumulation of bulk material with 5 percent or greater silt content which is not fully enclosed, covered or chemically stabilized, and which attains a height of three feet or more and a total surface area of 150 or more square feet. Silt content level is assumed to be 5 percent or greater unless a person can show, by sampling and analysis in accordance with ASTM Method C-136, that the silt content is less than 5 percent. The



Source: South Coast Air Quality Management District "Rules and Regulations", 1992.

results of ASTM Method C-136 are valid for 60 days from the date the sample was taken.

(15) PARTICULATE MATTER means any material, except uncombined water, which exists in a finely divided form as a liquid or solid at standard conditions.

(16) PM10 is particulate matter with an aerodynamic diameter smaller than or equal to 10 microns as measured by the applicable State and Federal reference test methods.

(17) PROPERTY LINE means the boundaries of an area in which either a person causing the emission or a person allowing the emission has the legal use or possession of the property. Where such property is divided into one or more sub-tenancies, the property line(s) shall refer to the boundaries dividing the areas of all sub-tenancies.

(18) REASONABLY AVAILABLE CONTROL MEASURES are techniques and procedures used to prevent or reduce the emission and airborne transport of fugitive dust. These include, but are not limited to, application of dust suppressants, use of coverings or enclosures, paving, enshrouding, planting, reduction of vehicle speeds, and other measures as specified by the Executive Officer. (A detailed listing of reasonably available control measures for each fugitive dust source type is contained in the Rule 403 Implementation Handbook, dated September 1992.)

(19) SIMULTANEOUS SAMPLING means the operation of two PM10 samplers in such a manner that one sampler is started within five minutes of the other, and each sampler is operated for a consecutive period which must be not less than 290 minutes and not more than 310 minutes.

(20) UNPAVED ROADS are any unsealed or unpaved roads, equipment paths, or travel ways that are not covered by one of the following: concrete, asphaltic concrete, or asphalt. Public unpaved roads are any unpaved roadway owned and maintained by Federal, State, county, municipal or other governmental or quasi-governmental agencies. Private unpaved roads are all other unpaved roadways not defined as public.

(21) WIND-DRIVEN FUGITIVE DUST means visible emissions from any disturbed surface area which is generated by wind action alone.

(22) WIND GUST is the maximum instantaneous wind speed as measured by an anemometer.





(d) Requirements

(1) A person shall not cause or allow the emissions of fugitive dust from any active operation, open storage pile, or disturbed surface area that the presence of such dust remains visible in the atmosphere beyond the property line of the emission source.

(2) A person shall utilize one or more reasonably available control measures to minimize fugitive dust emissions from each fugitive dust source type which is part of any active operation.

(3) A person shall not cause or allow PM10 levels to exceed 50 micrograms per cubic meter when determined, by simultaneous sampling, as the difference between upwind and downwind samples collected on high-volume particulate matter samplers or other EPA-approved equivalent method for PM10 monitoring. Samplers shall be:

(A) Operated, maintained, and calibrated in accordance with 40 Code of Federal Regulations (CFR), Part 50, Appendix J, or appropriate EPA-published documents for EPA-approved equivalent method(s) for PM10.

(B) Reasonably placed upwind and downwind of key activity areas and as close to the property line as feasible, such that other sources of fugitive dust between the sampler and the property line are minimized.

(C) Operated during active operations.

(D) Operated in accordance with the sampling protocol as specified in the District's Rule 403 Implementation Handbook, dated September 1992.

(4) A person shall prevent visible particulate matter from being deposited upon public paved roadways as a direct result of their operations. Preventive measures shall include the removal of particulate matter from equipment prior to movement on public paved roadways, the removal of any material from public paved roadways onto which such material has been deposited at the conclusion of the work day or at any time visible particulate matter is tracked onto a public paved roadway for a distance of 50 feet or more from a property access road, and/or any other methods approved by the Executive Officer.



Source: South Coast Air Quality Management District "Rules and Regulations", 1992.

(e) Special Requirements for Large Operations

(1) No person shall conduct or authorize the conducting of a large operation which is subject to the requirements of this rule without either conducting on-site PM10 air quality monitoring and associated recordkeeping, or obtaining an approved fugitive dust emissions control plan pursuant to paragraph (e)(2) or (e)(3).

(2) Any person subject to paragraph (e)(1) who elects to conduct on-site PM10 monitoring and recordkeeping shall take the following actions:

(A) Notify the Executive Officer of the intent to monitor for PM10 at least seven (7) days prior to initiating such monitoring. The notification shall contain, at a minimum, the person's name, address, telephone number, brief description of the operation(s), and anticipated first date of sampling, as specified in the District's Rule 403 Implementation Handbook, dated September 1992.

(B) Install an on-site anemometer to document upwind/downwind conditions. Such anemometer shall be mounted at least 12 feet above ground level, shall be placed in a position so as to obtain the representative wind pattern at the site, and shall be located between the upwind and downwind PM10 monitors. Installation shall be in accordance with the procedures specified in the District's Rule 403 Implementation Handbook, dated September 1992.

(C) Be responsible for the acquisition, calibration, operation of PM10 samplers, and the acquisition, maintenance, and operation of the on-site anemometer.

(D) Collect samples on four separate days during each calendar quarter. Sampling must be conducted during typical operations, and during representative wind conditions, as specified in the District's Rule 403 Implementation Handbook, dated September 1992. All provisions of the rule will continue to be applicable on days when monitoring is not conducted.

(E) Collect samples on four additional days during one calendar quarter if requested by the Executive Officer based on complaints by the public, visible dust emissions, or other determinations by District personnel which indicate that violations of the conditions specified in subparagraph (d)(3) may be occurring. Each sampling day must be





conducted during typical operations, and during representative wind conditions, as specified in the District's Rule 403 Implementation Handbook, dated September 1992.

(F) Conduct laboratory analyses in accordance with 40 CFR, Part 50, Appendix J for all samples collected as required by subparagraph (e)(2)(D) and (e)(2)(E).

(G) Compile and submit records to the District on a quarterly basis, not later than 30 days after the end of each calendar quarter. Such records shall include:

(i) A brief description of the operation(s);

(ii) Hours of active operations on days when particulate sampling occurs;

(iii) Location, vendor, model, and serial number of PM10 samplers used on each sampling day;

(iv) Date, start and end times of all PM10 sampling;

(v) Laboratory results of all PM10 samples;

(vi) A list of consultants, laboratories, and other groups and individuals responsible for the collection, analysis, evaluation and validation of each PM10 sample;

(vii) Documentation of any maintenance and calibration actions performed on each of the PM10 samplers conducted in accordance with 40 CFR, Part 50, Appendix J.

(viii) Location, vendor, model, and serial number of the on-site anemometer.

(ix) An analog chart recording or digitized output of continuous or hourly-averaged wind speeds and direction during hours of PM10 sampling.

(x) Documentation of any maintenance actions performed on the on-site anemometer.

(3) Any person subject to paragraph (e)(1) who elects to obtain an approved fugitive dust emissions control plan shall take the following actions:

(A) At least 45 calendar days prior to a calendar quarter for which air monitoring would be conducted in accordance with paragraph (e)(2), submit to the Executive Officer a fugitive dust emissions control plan, which shall include at least:



Source: South Coast Air Quality Management District "Rules and Regulations", 1992.

(i) The name(s), address(es), and phone number(s) of the person(s) responsible for the preparation, submittal, and implementation of the plan;

(ii) A description of the operation(s);

(iii) A listing of all sources of fugitive dust emissions within the property lines;

(iv) A description of reasonably available control measures as applied to each of the sources identified in clause (e)(3)(A)(iii). The description must be sufficiently detailed to demonstrate that such reasonably available control measures will be utilized and/or installed during all periods of active operations.

(B) In the event that there are special technical (e.g., non-economic) circumstances which prevent the use of reasonably available control measures for any of the sources identified in clause (e)(3)(A)(iii), a justification statement must be provided in lieu of the description required in clause (e)(3)(A)(iv). The justification statement must explain the reason(s) why reasonably available control measures cannot be implemented.

(C) The Executive Officer will either approve, conditionally approve, or disapprove the plan, in writing, within 30 calendar days of the receipt of the plan. For a Plan to be approved or conditionally approved, three conditions must be satisfied:

(i) All sources of fugitive dust emissions must be identified (e.g., earth-moving, storage piles, vehicular traffic on unpaved roads, etc.).

(ii) For each source identified, at least one reasonably available control measure must be implemented; and

(iii) If, after implementation of control measures, visible dust emissions are crossing the property line(s), then contingency measures (e.g., increased watering) must be specified for immediate implementation.

(D) Conditional approval will be made if conditions are met, but the stated measures do not satisfactorily conform to the guidance contained in the Rule 403 Implementation Handbook. If a plan is





conditionally approved, the conditions necessary to modify the plan will be provided in writing to the person(s) identified in clause (e)(3)(A)(i). Such modifications must be incorporated into the plan within 30 days of the receipt of the notice of conditional approval, or the plan shall be disapproved. A letter to the Executive Officer stating that such modifications will be incorporated into the plan shall be deemed sufficient to result in approval of the plan.

(E) Any plan disapproved by the Executive Officer shall require air monitoring and recordkeeping in accordance with paragraph (e)(2).

(F) Failure to comply with any of the provisions in an approved or conditionally approved plan shall result in a violation of subdivision (e).

(G) Any approved plan shall be valid for a period of one year from the date of approval or conditional approval of the plan. Plans must be resubmitted annually, at least 60 days prior to the expiration date, or the plan shall become disapproved as of the expiration date. If all fugitive dust sources and corresponding reasonably available control measures or special circumstances remain identical to those identified in the previously approved plan, the resubmittal may contain a simple statement of no-change. Otherwise, a resubmittal must contain all the items specified in subparagraphs (e)(3)(A) and (e)(3)(B).

(4) Any person subject to the requirements of paragraph (e)(1) who no longer exceeds, and does not expect to exceed for a period of at least one year, the criteria for a large operation may request a reclassification as a non-large operation. To obtain this reclassification, a person must submit a request in writing to the Executive Officer specifying the conditions which have taken place to reduce the disturbed surface area and/or the earth-moving or throughput conditions to levels below the criteria for large operations. A person must further indicate that the criteria for large operations are not expected to be exceeded during the subsequent 12-month period. The Executive Officer shall either approve or disapprove the reclassification within 60 days from receipt of the reclassification request. The Executive Officer will disapprove the request if the indicated changes can not be verified to be below the criteria for large operations. If approved, the person shall be relieved of all requirements under paragraphs (e)(1), (e)(2), and



Source: South Coast Air Quality Management District "Rules and Regulations", 1992.

(e)(3). Any person so reclassified would again be subject to the requirements of paragraph (e)(1) if at any time subsequent to the reclassification the criteria for large operations are met.

(f) Compliance Schedule

All provisions of this rule shall become effective on February 1, 1993. Until that date, all provisions of the existing rule, as adopted May 7, 1976, shall remain in effect.

(g) Exemptions

(1) The provisions of this rule shall not apply to:

(A) Agricultural operations;

(B) Any disturbed surface area less than one-half (1/2) acre on residential property;

(C) Active operations conducted during emergency life-threatening situations, or in conjunction with any officially declared disaster or state of emergency.

(D) Active operations conducted by essential service utilities to provide electricity, natural gas, telephone, water and sewer during periods of service outages and emergency disruptions.

(E) Any contractor subsequent to the time the contract ends, provided that such contractor implemented reasonably available control measures during the contractual period.

(F) Any grading contractor, for a phase of active operations, subsequent to the contractual completion of that phase of earth-moving activities, provided that reasonably available control measures have been implemented during the entire phase of earth-moving activities, through and including five days after the final grading inspection.

(2) The provisions of paragraphs (d)(1) and (d)(3) shall not apply:

(A) When wind gusts exceed 25 miles per hour, provided that:

(i) Reasonably available control measures for high wind conditions are implemented for each applicable fugitive dust source type, as specified in Table 1, or;

(ii) A person submits a "High Wind Fugitive Dust Control Plan" which indicates technical reasons why any reasonably available



Rule 403 (Cont.) (Amended November 6, 1992)

control measure for high wind conditions, as specified in Table 1, cannot be implemented. The Plan must futher provide an alternative measure of fugitive dust control, if technically feasible. Such plan will be subject to the same approval conditions as specified in subparagraphs (e)(3)(C) and (e)(3)(D);

(B) To unpaved roads, provided such roads:

(i) are less than 50 feet in width at all points along the road;

(ii) are within 25 feet of the property line; and

(iii) have a traffic volume less than 20 vehicle-trips per day.

(C) To any active operation, open storage pile, or disturbed surface area for which necessary fugitive dust preventive or mitigative actions are in conflict with the federal Endangered Species Act.

(D) To non-routine or emergency maintenance of flood control channels and water spreading basins.

(3) The provisions of paragraphs (d)(1), (d)(2), and (d)(3) shall not apply to:

(A) Blasting operations which have been permitted by the California Division of Industrial Safety; and

(B) Motion picture, television, and video production activities when dust emissions are required for visual effects. In order to obtain this exemption, the Executive Officer must receive notification in writing at least 72 hours in advance of any such activity.

(4) The provisions of paragraph (d)(3) shall not apply if the dust control actions, as specified in Table 2, are implemented on a routine basis for each applicable fugitive dust source type. To qualify for this exemption, a person must maintain records to document the dates of active operations, all applicable fugitive dust source types, and the actions taken consistent with Table 2; and must make such records available to the Executive Officer upon request.

(5) The provisions of paragraph (e)(2) shall not be applicable for a period of:

(A) One calendar quarter subsequent to the date this rule becomes effective for each large operation;

(B) One calendar quarter for each new large operation; and

(C) Fourteen (14) calendar days after the approval or conditional approval of a fugitive dust emission control plan.



Source: South Coast Air Quality Management District "Rules and Regulations", 1992.

(6) The provisions of subdivision (e) shall not apply to officially-designated public parks and recreational areas, including national parks, national monuments, national forests, state parks, state recreational areas, and county regional parks.

TABLE 1

REASONABLY AVAILABLE CONTROL MEASURES FOR HIGH WIND CONDITIONS

| FUGITIVE DUST SOURCE TYPE | CONTROL MEASURES |
| --- | --- |
| Earth-moving | (1A) Cease all active operations, OR<br>(2A) Apply water to soil not more than 15 minutes prior to moving such soil |
| Disturbed surface areas | (1B) Apply chemical stabilizers prior to wind event, OR<br>(2B) Apply water to all unstabilized disturbed areas 3 times per day; OR<br>(3B) Take the actions specified in Table 2, Item (3c); OR<br>(4B) Utilize any combination of control actions (1B), (2B), and (3B) such that, in total, these actions apply to all disturbed surface areas. |
| Upaved roads | (1C) Apply chemical stabilizers prior to wind event, OR<br>(2C) Apply water once per hour during active operation, OR<br>(3C) Stop all vehicular traffic |
| Open storage piles | (1D) Apply water once per hour, OR<br>(2D) Install temporary coverings |
| Paved road track-out | (1E) Cover all haul vehicles; OR<br>(2E) Comply with the vehicle freeboard requirements of Section 23114 of the California Vehicle Code for both public and private roads. |





TABLE 2

DUST CONTROL ACTIONS FOR EXEMPTION FROM PARAGRAPH (d)(3)

FUGITIVE DUST SOURCE TYPE — CONTROL ACTIONS

**Earth-moving (except construction cutting and filling areas, and mining operations)**

(1a) Maintain soil moisture content at a minimum of 12 percent, as determined by ASTM method D-2216, or other equivalent method approved by the Executive Officer. Two soil moisture evaluations must be conducted during the first three hours of active operations during a calendar day, and two such evaluations each subsequent four-hour period of active operations.

**Earth-moving: Construction fill areas**

(1b) Maintain soil moisture content at a minimum of 12 percent, as determined by ASTM method D-2216, or other equivalent method approved by the Executive Officer. For areas which have an optimum moisture content for compaction of less than 12 percent, as determined by ASTM Method 1557 or other equivalent method approved by the Executive Officer, complete the compaction process as expeditiously as possible after achieving at least 70 percent of the optimum soil moisture content. Two soil moisture evaluations must be conducted during the first three hours of active operations during a calendar day, and two such evaluations during each subsequent four-hour period of active operations.

**Earth-moving: Construction cut areas and mining operations**

(1c) Conduct watering as necessary to prevent visible emissions from extending more than 100 feet beyond the active cut or mining area unlesss the area is inaccessible to watering vehicles due to slope conditions or other safety factors.

**Disturbed surface areas (except completed grading areas)**

(2a) Apply dust suppressants in sufficient quantity and frequency to maintain a stabilized surface; AND

(2b) Apply water at least twice per day to at least 70 percent of all unstabilized disturbed surface areas.



Source: South Coast Air Quality Management District "Rules and Regulations", 1992.

TABLE 2

(Continued)

**Disturbed surface areas: Completed grading areas**

(2c) Apply dust suppressants within five working days of grading completion; OR

(2d) Take actions specified for inactive disturbed surface areas.

**Inactive disturbed surface areas**

(3a) Apply water to at least 70 percent of all inactive disturbed surface areas on a daily basis when there is evidence of wind driven fugitive dust, excluding any areas which are inaccessible to watering vehicles due to excessive slope or other safety conditions; OR

(3b) Apply dust suppressants in sufficient quantity and frequency to maintain a stabilized surface; OR

(3c) Establish a vegetative ground cover within 30 days after active operations have ceased. Ground cover must be of sufficient density to expose less than 30 percent of unstabilized ground within 90 days of planting, and at all times thereafter; OR

(3d) Utilize any combination of control actions (3a), (3b), and (3c) such that, in total, these actions apply to all inactive disturbed surface areas.

**Upaved Roads**

(4a) Water all roads used for any vehicular traffic at least three times per day; OR

(4b) Water all roads used for any vehicular traffic once daily and restrict vehicle speeds to 15 miles per hour; OR

(4c) Apply a chemical stabilizer to all unpaved road surfaces in sufficient quantity and frequency to maintain a stabilized surface.

**Open storage piles**

(5a) Apply chemical stabilizers in sufficient quantity and frequency to maintain a stabilized surface; OR

(5b) Apply water to at least 70 percent of the surface area of all open storage piles on a daily basis when there is evidence of wind driven fugitive dust.



Source: South Coast Air Quality Management District "Rules and Regulations", 1992.

## Natural Gas and Electrical Consumption - Existing Land Use 1994

| Land Use | Quantity | Units | Gas Rate (CF/Mo) | Elec. Rate (kWh/Yr) | Gas Use (CF/Mo) | Gas Use (CF/Day) | Electrical Use (Kwh/Yr) | Electrical Use (Kwh/Day) |
|---|---|---|---|---|---|---|---|---|
| SF Residential | 17,175 | DU | 6665.00 | 5626.50 | 114,471,375 | 3,760,867 | 96,635,138 | 264,573 |
| MF Residential | 9,731 | DU | 4012.00 | 5626.50 | 39,040,772 | 1,282,654 | 54,751,472 | 149,901 |
| Offices | 2,438,000 | SF | 2.00 | 12.95 | 4,876,000 | 160,197 | 31,572,100 | 86,440 |
| Commercial | 3,099,000 | SF | 2.90 | 13.55 | 8,987,100 | 295,264 | 41,991,450 | 114,966 |
| Industrial | 3,288,000 | SF | 3.30 | 10.50 | 10,850,400 | 356,481 | 34,524,000 | 94,522 |
| | | | | | Gas Total | 5,855,463 | Elec. Total | 710,402 |

**NOTES:** 1. Natural gas and electric usage rates are from SCAQMD "CEQA Air Quality Handbook", 1993.
2. Land use data provided by Smith Peroni & Fox dated 7/18/95.

Natural Gas and Electrical Consumption - Alt. 1 Proposed General Plan

| Land Use | Quantity | Units | Gas Rate (CF/Mo) | Elec. Rate (kWh/Yr) | Gas Use (CF/Mo) | Gas Use (CF/Day) | Electrical Use (Kwh/Yr) | Electrical Use (Kwh/Day) |
|---|---|---|---|---|---|---|---|---|
| SF Residential | 23,593 | DU | 6665.00 | 5626.50 | 157,247,345 | 5,166,237 | 132,746,015 | 363,439 |
| MF Residential | 12,821 | DU | 4012.00 | 5626.50 | 51,437,852 | 1,689,950 | 72,137,357 | 197,501 |
| Offices | 10,048,000 | SF | 2.00 | 12.95 | 20,096,000 | 660,238 | 130,121,600 | 356,254 |
| Commercial | 8,646,000 | SF | 2.90 | 13.55 | 25,073,400 | 823,767 | 117,153,300 | 320,748 |
| Industrial | 21,642,000 | SF | 3.30 | 10.50 | 71,418,600 | 2,346,402 | 227,241,000 | 622,152 |
| | | | | | Gas Total | 10,686,594 | Elec. Total | 1,860,094 |

**NOTES:** 1. Natural gas and electric usage rates are from SCAQMD "CEQA Air Quality Handbook", 1993.

2. Land use data provided by Smith Peroni & Fox dated 7/18/95.

## Natural Gas and Electrical Consumption - Alt. 2 Existing General Plans

| Land Use | Quantity | Units | Gas Rate (CF/Mo) | Elec. Rate (kWh/Yr) | Gas Use (CF/Mo) | Gas Use (CF/Day) | Electrical Use (Kwh/Yr) | Electrical Use (Kwh/Day) |
|---|---|---|---|---|---|---|---|---|
| SF Residential | 24,013 | DU | 6665.00 | 5626.50 | 160,046,645 | 5,258,206 | 135,109,145 | 369,909 |
| MF Residential | 14,208 | DU | 4012.00 | 5626.50 | 57,002,496 | 1,872,772 | 79,941,312 | 218,867 |
| Offices | 8,397,140 | SF | 2.00 | 12.95 | 16,794,280 | 551,763 | 108,742,963 | 297,722 |
| Commercial | 8,924,780 | SF | 2.90 | 13.55 | 25,881,862 | 850,328 | 120,930,769 | 331,090 |
| Industrial | 29,474,520 | SF | 3.30 | 10.50 | 97,265,916 | 3,195,595 | 309,482,460 | 847,317 |
| | | | | | Gas Total | 11,728,664 | Elec. Total | 2,064,905 |

**NOTES:** 1. Natural gas and electric usage rates are from SCAQMD "CEQA Air Quality Handbook", 1993.
2. Land use data provided by Smith Peroni & Fox dated 7/24/95.

Natural Gas and Electrical Consumption - Alt. 3 No Development

| Land Use | Quantity | Units | Gas Rate (CF/Mo) | Elec. Rate (kWh/Yr) | Gas Use (CF/Mo) | Gas Use (CF/Day) | Electrical Use (Kwh/Yr) | Electrical Use (Kwh/Day) |
|---|---|---|---|---|---|---|---|---|
| SF Residential | 17,175 | DU | 6665.00 | 5626.50 | 114,471,375 | 3,760,867 | 96,635,138 | 264,573 |
| MF Residential | 9,731 | DU | 4012.00 | 5626.50 | 39,040,772 | 1,282,654 | 54,751,472 | 149,901 |
| Offices | 2,438,000 | SF | 2.00 | 12.95 | 4,876,000 | 160,197 | 31,572,100 | 86,440 |
| Commercial | 3,099,000 | SF | 2.90 | 13.55 | 8,987,100 | 295,264 | 41,991,450 | 114,966 |
| Industrial | 3,288,000 | SF | 3.30 | 10.50 | 10,850,400 | 356,481 | 34,524,000 | 94,522 |
| | | | | | Gas Total | 5,855,463 | Elec. Total | 710,402 |

**NOTES:** 1. Natural gas and electric usage rates are from SCAQMD "CEQA Air Quality Handbook", 1993.

2. Land use data provided by Smith Peroni & Fox dated 7/24/95.

Natural Gas and Electrical Consumption - Alt. 4 Reduced Development

| Land Use | Quantity | Units | Gas Rate (CF/Mo) | Elec. Rate (kWh/Yr) | Gas Use (CF/Mo) | Gas Use (CF/Day) | Electrical Use (Kwh/Yr) | Electrical Use (Kwh/Day) |
|---|---|---|---|---|---|---|---|---|
| SF Residential | 17,695 | DU | 6665.00 | 5626.50 | 117,937,175 | 3,874,733 | 99,560,918 | 272,583 |
| MF Residential | 9,616 | DU | 4012.00 | 5626.50 | 38,579,392 | 1,267,495 | 54,104,424 | 148,130 |
| Offices | 7,536,000 | SF | 2.00 | 12.95 | 15,072,000 | 495,179 | 97,591,200 | 267,190 |
| Commercial | 6,484,500 | SF | 2.90 | 13.55 | 18,805,050 | 617,825 | 87,864,975 | 240,561 |
| Industrial | 16,231,500 | SF | 3.30 | 10.50 | 53,563,950 | 1,759,801 | 170,430,750 | 466,614 |
| | | | | | Gas Total | 8,015,033 | Elec. Total | 1,395,078 |

**NOTES:** 1. Natural gas and electric usage rates are from SCAQMD "CEQA Air Quality Handbook", 1993.

2. Land use data provided by Smith Peroni & Fox dated 7/24/95.

Natural Gas and Electrical Consumption - Alt. 5 Reduced Traffic

| Land Use | Quantity | Units | Gas Rate (CF/Mo) | Elec. Rate (kWh/Yr) | Gas Use (CF/Mo) | Gas Use (CF/Day) | Electrical Use (Kwh/Yr) | Electrical Use (Kwh/Day) |
|---|---|---|---|---|---|---|---|---|
| SF Residential | 25,993 | DU | 6665.00 | 5626.50 | 173,243,345 | 5,691,773 | 146,249,615 | 400,410 |
| MF Residential | 12,821 | DU | 4012.00 | 5626.50 | 51,437,852 | 1,689,950 | 72,137,357 | 197,501 |
| Offices | 7,049,000 | SF | 2.00 | 12.95 | 14,098,000 | 463,179 | 91,284,550 | 249,923 |
| Commercial | 5,496,000 | SF | 2.90 | 13.55 | 15,938,400 | 523,644 | 74,470,800 | 203,890 |
| Industrial | 14,991,000 | SF | 3.30 | 10.50 | 49,470,300 | 1,625,308 | 157,405,500 | 430,953 |
| | | | | | Gas Total | 9,993,853 | Elec. Total | 1,482,677 |

**NOTES:** 1. Natural gas and electric usage rates are from SCAQMD "CEQA Air Quality Handbook", 1993.

2. Land use data provided by Smith Peroni & Fox dated 7/31/95.

Stationary Source and Total Emissions Worksheet

| Land Use Scenarios | Natural Gas Use (CF/Day) | Electricity Usage (kWh/Day) | Air Pollutant | Nat Gas E.F. (Lbs./CF) | Nat Gas Emissions (Lbs./Day) | Elec. E.F. (Lbs./kWh) | Electric Emissions (Lbs./Day) | Mobile Emissions (Lbs./Day) | Total Emissions (Lbs./Day) | Total Emissions (Tons/Day) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Existing Conditions - 1994** | | | **CO** | 0.0000200 | 16.24 | 0.00020 | 142.08 | 96,852.64 | 97,010.96 | **48.5** |
| - Commercial | 811,942 | 710,402 | **ROC** | 0.0000053 | 4.30 | 0.00001 | 7.10 | 18,885.68 | 18,897.09 | **9.4** |
| - Domestic | 5,043,521 | | **NOx** | 0.0001200 | 500.91 | 0.00115 | 816.96 | 14,465.42 | 15,783.30 | **7.9** |
| | | | **SOx** | Negligible | 0.00 | 0.00012 | 85.25 | 1,153.21 | 1,238.46 | **0.6** |
| | | | **PM10** | 0.0000002 | 0.16 | 0.00004 | 28.42 | 2,521.71 | 2,550.29 | **1.3** |
| **Proposed GP Alt.1** | | | **CO** | 0.0000200 | 76.61 | 0.00020 | 372.02 | 112,320.40 | 112,769.03 | **56.4** |
| - Commercial | 3,830,407 | 1,860,094 | **ROC** | 0.0000053 | 20.30 | 0.00001 | 18.60 | 12,305.91 | 12,344.81 | **6.2** |
| - Domestic | 6,856,187 | | **NOx** | 0.0001200 | 1008.14 | 0.00115 | 2139.11 | 20,601.82 | 23,749.07 | **11.9** |
| | | | **SOx** | Negligible | 0.00 | 0.00012 | 223.21 | 1,866.37 | 2,089.58 | **1.0** |
| | | | **PM10** | 0.0000002 | 0.77 | 0.00004 | 74.40 | 3,763.27 | 3,838.44 | **1.9** |
| **Existing GP Alt. 2** | | | **CO** | 0.0000200 | 91.95 | 0.00020 | 412.98 | 119,264.49 | 119,769.42 | **59.9** |
| - Commercial | 4,597,686 | 2,064,905 | **ROC** | 0.0000053 | 24.37 | 0.00001 | 20.65 | 13,066.71 | 13,111.73 | **6.6** |
| - Domestic | 7,130,978 | | **NOx** | 0.0001200 | 1122.20 | 0.00115 | 2374.64 | 21,875.50 | 25,372.34 | **12.7** |
| | | | **SOx** | Negligible | 0.00 | 0.00012 | 247.79 | 1,981.75 | 2,229.54 | **1.1** |
| | | | **PM10** | 0.0000002 | 0.92 | 0.00004 | 82.60 | 3,995.93 | 4,079.45 | **2.0** |
| **No Development Alt. 3** | | | **CO** | 0.0000200 | 16.24 | 0.00020 | 142.08 | 52,135.05 | 52,293.37 | **26.1** |
| - Commercial | 811,942 | 710,402 | **ROC** | 0.0000053 | 4.30 | 0.00001 | 7.10 | 5,710.77 | 5,722.18 | **2.9** |
| - Domestic | 5,043,521 | | **NOx** | 0.0001200 | 500.91 | 0.00115 | 816.96 | 9,560.04 | 10,877.92 | **5.4** |
| | | | **SOx** | Negligible | 0.00 | 0.00012 | 85.25 | 866.01 | 951.26 | **0.5** |
| | | | **PM10** | 0.0000002 | 0.16 | 0.00004 | 28.42 | 1,746.20 | 1,774.78 | **0.9** |
| **Reduced Develop. Alt. 4** | | | **CO** | 0.0000200 | 57.46 | 0.00020 | 279.02 | 97,718.86 | 98,055.33 | **49.0** |
| - Commercial | 2,872,805 | 1,395,078 | **ROC** | 0.0000053 | 15.23 | 0.00001 | 13.95 | 10,706.16 | 10,735.34 | **5.4** |
| - Domestic | 5,142,228 | | **NOx** | 0.0001200 | 756.11 | 0.00115 | 1604.34 | 17,923.60 | 20,284.05 | **10.1** |
| | | | **SOx** | Negligible | 0.00 | 0.00012 | 167.41 | 1,623.74 | 1,791.15 | **0.9** |
| | | | **PM10** | 0.0000002 | 0.57 | 0.00004 | 55.80 | 3,274.05 | 3,330.43 | **1.7** |
| **Reduced Traffic Alt. 5** | | | **CO** | 0.0000200 | 52.24 | 0.00020 | 296.54 | 92,513.57 | 92,862.35 | **46.4** |
| - Commercial | 2,612,130 | 1,482,677 | **ROC** | 0.0000053 | 13.84 | 0.00001 | 14.83 | 10,135.86 | 10,164.53 | **5.1** |
| - Domestic | 7,381,723 | | **NOx** | 0.0001200 | 903.99 | 0.00115 | 1705.08 | 16,968.85 | 19,577.92 | **9.8** |
| | | | **SOx** | Negligible | 0.00 | 0.00012 | 177.92 | 1,537.25 | 1,715.17 | **0.9** |
| | | | **PM10** | 0.0000002 | 0.52 | 0.00004 | 59.31 | 3,099.64 | 3,159.47 | **1.6** |

NOTES: 1. Natural gas and electricity emission factors were from the SCAQMD "CEQA Air Quality Handbook", April 1993, Tables A9-11 and A9-12.
2. NOx emission factors are .00012 for commercial boilers and .00008 for domestic boilers.
3. Emission rates for commercial and domestic electricity demand are identical.
4. Refer to Mobile Source Emissions Inventory Worksheet for mobile emissions calculations.

# Year 1994 Mobile Source Emissions Inventory - Existing Land Uses

| Input Parameters | |
|---|---|
| Project Name: | Redlands GP |
| Analysis Year: | 1994 |
| County: | San Bernardino |
| Area: | 4 |
| Trip Length Area | San Bernardino |
| Total ADT: | 467,900 |

**Calculated Parameters**

| | | | | | | |
|---|---|---|---|---|---|---|
| Work %: | 38.76 | Work Trip Length: | 13.81 | AM Speed: | 32 | CO/NOx |
| Non-Work %: | 61.24 | Non-Work Length: | 7.27 | Off Peak Speed: | 38 | ROC |
| Work ADT: | 181,358 | % VMT <6,000 lbs: | 86.00 | PM Speed: | 27 | SOx/PM10/Pb |
| Non-Work ADT: | 286,542 | % VMT >6,000 lbs: | 14.00 | % Cold Starts <6,000: | 52.63 | |
| % ADT <6,000 lbs: | 86.30 | Total VMT: | 4,588,599 | % Cold Starts >6,000: | 48.78 | |
| % ADT >6,000 lbs: | 13.70 | | | | | |

**Oxides of Sulfur Emissions**

| | VMT | Running EF (g/mile) | Run. Exhaust (g/day) |
|---|---|---|---|
| VMT <6,000 lbs | 3,946,195 | 0.07 | 276,233.68 |
| VMT >6,000 lbs | 642,404 | 0.39 | 247,325.50 |

**Total SOx Emissions (lbs/day)** 1,153.21

**Lead Emissions**

| | VMT | Running EF (g/mile) | Run. Exhaust (g/day) |
|---|---|---|---|
| VMT <6,000 lbs | 3,946,195 | 0.00015 | 572.19833 |
| VMT >6,000 lbs | 642,404 | 0.00140 | 899.36546 |

**Total Lead Emissions (lbs/day)** 3.24

**PM10 Emissions**

| | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Tire Wear Fac (g/mile) | Tire Wear Emis. (g/day) |
|---|---|---|---|---|---|
| VMT <6,000 lbs | 3,946,195 | 0.02 | 78,923.91 | 0.10 | 394,619.54 |
| VMT >6,000 lbs | 642,404 | 0.86 | 549,255.33 | 0.19 | 122,056.74 |

**Total PM10 Emissions (lbs/day)** 2,521.71

**Carbon Monoxide Emissions**

| | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Cold Start EF (g/trip) | Cold Start Emis. (g/day) | Hot Start EF (g/trip) | Hot Start Emis. (g/day) |
|---|---|---|---|---|---|---|---|
| VMT <6,000 lbs | 3,946,195 | 5.03 | 19,842,843.0 | 58.13 | 12,352,540.1 | 10.90 | 2,085,160.85 |
| VMT >6,000 lbs | 642,404 | 12.76 | 8,194,280.69 | 43.33 | 1,354,751.31 | 4.31 | 141,524.90 |
| ADT <6,000 lbs | 403,798 | | | | | | |
| ADT >6,000 lbs | 64,102 | | | | | | |

**Total CO Emissions (lbs/day)** 96,852.64

**Oxides of Nitrogen Emissions**

| | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Cold Start EF (g/trip) | Cold Start Emis. (g/day) | Hot Start EF (g/trip) | Hot Start Emis. (g/day) |
|---|---|---|---|---|---|---|---|
| VMT <6,000 lbs | 3,946,195 | 0.60 | 2,377,668.50 | 2.52 | 535,496.32 | 1.30 | 248,688.91 |
| VMT >6,000 lbs | 642,404 | 5.15 | 3,310,782.11 | 2.03 | 63,469.77 | 0.95 | 31,194.58 |
| ADT <6,000 lbs | 403,798 | | | | | | |
| ADT >6,000 lbs | 64,102 | | | | | | |

**Total NOx Emissions (lbs/day)** 14,465.42

**ROC Emissions**

| | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Cold Start EF (g/trip) | Cold Start Emis. (g/day) | Hot Start EF (g/trip) | Hot Start Emis. (g/day) | Hot Soak EF (g/trip) | Hot Soak Emis. (g/day) | Diurnal EF (g/trip) | Diurnal Emis. (g/day) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VMT <6,000 lbs | 3,946,195 | 0.28 | 1,113,513.39 | 4.36 | 926,493.63 | 0.96 | 183,647.19 | 1.11 | 4,380,276.87 | 2.90 | 585,506.67 |
| VMT >6,000 lbs | 642,404 | 1.07 | 685,137.72 | 2.64 | 82,541.97 | 0.68 | 22,328.75 | 0.77 | 494,651.00 | 3.12 | 99,999.59 |
| ADT <6,000 lbs | 403,798 | | | | | | | | | | |
| ADT >6,000 lbs | 64,102 | | | | | | | | | | |

**Total ROC Emissions (lbs/day)** 18,885.68

Notes: ADT = Average Daily Trips, VMT = Vehicle Miles Traveled per day.

# Buildout Mobile Source Emissions Inventory - Redlands Alt. 1

| Input Parameters | | Calculated Parameters | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Project Name:** | Redlands GP | **Work %:** | 38.88 | **Work Trip Length:** | 13.60 | **AM Speed:** | 27 | CO/NOx |
| **Analysis Year:** | 2010 | **Non-Work %:** | 61.12 | **Non-Work Length:** | 7.90 | **Off Peak Speed:** | 35 | ROC |
| **County:** | San Bernardino | **Work ADT:** | 391,794 | **% VMT <6,000 lbs:** | 85.60 | **PM Speed:** | 20 | SOx/PM10/Pb |
| **Area:** | 4 | **Non-Work ADT:** | 615,906 | **% VMT >6,000 lbs:** | 14.40 | **% Cold Starts <6,000:** | 53.00 | |
| **Trip Length Area** | San Bernardino | **% ADT <6,000 lbs:** | 85.50 | **Total VMT:** | 10,194,054 | **% Cold Starts >6,000:** | 51.77 | |
| **Total ADT:** | 1,007,700 | **% ADT >6,000 lbs:** | 14.50 | | | | | |

| **Oxides of Sulfur Emissions** | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | **Total SOx Emissions (lbs/day)** |
|---|---|---|---|---|
| VMT <6,000 lbs | 8,726,111 | 0.05 | 436,305.53 | |
| VMT >6,000 lbs | 1,467,944 | 0.28 | 411,024.27 | **1,866.37** |

| **Lead Emissions** | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | **Total Lead Emissions (lbs/day)** |
|---|---|---|---|---|
| VMT <6,000 lbs | 8,726,111 | N/A | N/A | |
| VMT >6,000 lbs | 1,467,944 | 0.00040 | 587.17754 | **1.29** |

| **PM10 Emissions** | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Tire Wear Fac (g/mile) | Tire Wear Emis. (g/day) | **Total PM10 Emissions (lbs/day)** |
|---|---|---|---|---|---|---|
| VMT <6,000 lbs | 8,726,111 | 0.01 | 87,261.11 | 0.10 | 872,611.06 | |
| VMT >6,000 lbs | 1,467,944 | 0.33 | 484,421.47 | 0.18 | 264,229.89 | **3,763.27** |

| **Carbon Monoxide Emissions** | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Cold Start EF (g/trip) | Cold Start Emis. (g/day) | Hot Start EF (g/trip) | Hot Start Emis. (g/day) | **Total CO Emissions (lbs/day)** |
|---|---|---|---|---|---|---|---|---|
| VMT <6,000 lbs | 8,726,111 | 1.97 | 17,164,259.5 | 46.54 | 21,249,707.7 | 3.68 | 1,488,372.57 | |
| VMT >6,000 lbs | 1,467,944 | 6.12 | 8,989,688.07 | 25.37 | 1,918,537.74 | 2.60 | 182,893.77 | **112,320.40** |
| ADT <6,000 lbs | 861,584 | | | | | | | |
| ADT >6,000 lbs | 146,117 | | | | | | | |

| **Oxides of Nitrogen Emissions** | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Cold Start EF (g/trip) | Cold Start Emis. (g/day) | Hot Start EF (g/trip) | Hot Start Emis. (g/day) | **Total NOx Emissions (lbs/day)** |
|---|---|---|---|---|---|---|---|---|
| VMT <6,000 lbs | 8,726,111 | 0.23 | 2,041,909.88 | 1.14 | 518,285.55 | 0.25 | 99,211.34 | |
| VMT >6,000 lbs | 1,467,944 | 4.41 | 6,476,568.21 | 2.02 | 152,408.97 | 0.92 | 64,840.95 | **20,601.82** |
| ADT <6,000 lbs | 861,584 | | | | | | | |
| ADT >6,000 lbs | 146,117 | | | | | | | |

| **ROC Emissions** | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Cold Start EF (g/trip) | Cold Start Emis. (g/day) | Hot Start EF (g/trip) | Hot Start Emis. (g/day) | Hot Soak EF (g/trip) | Hot Soak Emis. (g/day) | Diurnal EF (g/trip) | Diurnal Emis. (g/day) | **Total ROC Emissions (lbs/day)** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VMT <6,000 lbs | 8,726,111 | 0.07 | 610,827.74 | 1.13 | 516,002.36 | 0.23 | 93,137.18 | 0.27 | 2,312,419.31 | 0.44 | 187,394.41 | |
| VMT >6,000 lbs | 1,467,944 | 0.78 | 1,137,656.47 | 1.24 | 93,790.14 | 0.36 | 25,372.55 | 0.36 | 528,459.78 | 1.12 | 81,825.24 | **12,305.91** |
| ADT <6,000 lbs | 861,584 | | | | | | | | | | | |
| ADT >6,000 lbs | 146,117 | | | | | | | | | | | |

Notes: ADT = Average Daily Trips, VMT = Vehicle Miles Traveled per day.

# Buildout Mobile Source Emissions Inventory - Redlands Alt. 2

**Input Parameters**

| | |
|---|---|
| **Project Name:** | Redlands GP |
| **Analysis Year:** | 2010 |
| **County:** | San Bernardino |
| **Area:** | 4 |
| **Trip Length Area** | San Bernardino |
| **Total ADT:** | 1,070,000 |

**Calculated Parameters**

| | | | | | | |
|---|---|---|---|---|---|---|
| **Work %:** | 38.88 | **Work Trip Length:** | 13.60 | **AM Speed:** | 27 | CO/NOx |
| **Non-Work %:** | 61.12 | **Non-Work Length:** | 7.90 | **Off Peak Speed:** | 35 | ROC |
| **Work ADT:** | 416,016 | **% VMT <6,000 lbs:** | 85.60 | **PM Speed:** | 20 | SOx/PM10/Pb |
| **Non-Work ADT:** | 653,984 | **% VMT >6,000 lbs:** | 14.40 | **% Cold Starts <6,000:** | 53.00 | |
| **% ADT <6,000 lbs:** | 85.50 | **Total VMT:** | 10,824,291 | **% Cold Starts >6,000:** | 51.77 | |
| **% ADT >6,000 lbs:** | 14.50 | | | | | |

**Oxides of Sulfur Emissions**

| | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Total SOx Emissions (lbs/day) |
|---|---|---|---|---|
| VMT <6,000 lbs | 9,265,593 | 0.05 | 463,279.66 | |
| VMT >6,000 lbs | 1,558,698 | 0.28 | 436,435.42 | **1,981.75** |

**Lead Emissions**

| | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Total Lead Emissions (lbs/day) |
|---|---|---|---|---|
| VMT <6,000 lbs | 9,265,593 | N/A | N/A | |
| VMT >6,000 lbs | 1,558,698 | 0.00040 | 623.47917 | **1.37** |

**PM10 Emissions**

| | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Tire Wear Fac (g/mile) | Tire Wear Emis. (g/day) | Total PM10 Emissions (lbs/day) |
|---|---|---|---|---|---|---|
| VMT <6,000 lbs | 9,265,593 | 0.01 | 92,655.93 | 0.10 | 926,559.33 | |
| VMT >6,000 lbs | 1,558,698 | 0.33 | 514,370.32 | 0.18 | 280,565.63 | **3,995.93** |

**Carbon Monoxide Emissions**

| | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Cold Start EF (g/trip) | Cold Start Emis. (g/day) | Hot Start EF (g/trip) | Hot Start Emis. (g/day) | Total CO Emissions (lbs/day) |
|---|---|---|---|---|---|---|---|---|
| VMT <6,000 lbs | 9,265,593 | 1.97 | 18,225,422.0 | 46.54 | 22,563,448.7 | 3.68 | 1,580,389.65 | |
| VMT >6,000 lbs | 1,558,698 | 6.12 | 9,545,466.14 | 25.37 | 2,037,149.33 | 2.60 | 194,200.98 | **119,264.49** |
| ADT <6,000 lbs | 914,850 | | | | | | | |
| ADT >6,000 lbs | 155,150 | | | | | | | |

**Oxides of Nitrogen Emissions**

| | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Cold Start EF (g/trip) | Cold Start Emis. (g/day) | Hot Start EF (g/trip) | Hot Start Emis. (g/day) | Total NOx Emissions (lbs/day) |
|---|---|---|---|---|---|---|---|---|
| VMT <6,000 lbs | 9,265,593 | 0.23 | 2,168,148.82 | 1.14 | 550,328.02 | 0.25 | 105,344.98 | |
| VMT >6,000 lbs | 1,558,698 | 4.41 | 6,876,975.28 | 2.02 | 161,831.50 | 0.92 | 68,849.67 | **21,875.50** |
| ADT <6,000 lbs | 914,850 | | | | | | | |
| ADT >6,000 lbs | 155,150 | | | | | | | |

**ROC Emissions**

| | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Cold Start EF (g/trip) | Cold Start Emis. (g/day) | Hot Start EF (g/trip) | Hot Start Emis. (g/day) | Hot Soak EF (g/trip) | Hot Soak Emis. (g/day) | Diurnal EF (g/trip) | Diurnal Emis. (g/day) | Total ROC Emissions (lbs/day) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VMT <6,000 lbs | 9,265,593 | 0.07 | 648,591.53 | 1.13 | 547,903.67 | 0.23 | 98,895.29 | 0.27 | 2,455,382.22 | 0.44 | 198,979.88 | |
| VMT >6,000 lbs | 1,558,698 | 0.78 | 1,207,990.90 | 1.24 | 99,588.61 | 0.36 | 26,941.18 | 0.36 | 561,131.26 | 1.12 | 86,884.00 | **13,066.71** |
| ADT <6,000 lbs | 914,850 | | | | | | | | | | | |
| ADT >6,000 lbs | 155,150 | | | | | | | | | | | |

Notes: ADT = Average Daily Trips, VMT = Vehicle Miles Traveled per day.

# Buildout Mobile Source Emissions Inventory - Redlands Alt. 3

| Input Parameters | |
|---|---|
| **Project Name:** | Redlands GP |
| **Analysis Year:** | 2010 |
| **County:** | San Bernardino |
| **Area:** | 4 |
| **Trip Length Area** | San Bernardino |
| **Total ADT:** | 467,900 |

| Calculated Parameters | | | | | | |
|---|---|---|---|---|---|---|
| **Work %:** | 38.76 | **Work Trip Length:** | 13.60 | **AM Speed:** | 27 | CO/NOx |
| **Non-Work %:** | 61.24 | **Non-Work Length:** | 7.90 | **Off Peak Speed:** | 35 | ROC |
| **Work ADT:** | 181,358 | **% VMT <6,000 lbs:** | 85.60 | **PM Speed:** | 20 | SOx/PM10/Pb |
| **Non-Work ADT:** | 286,542 | **% VMT >6,000 lbs:** | 14.40 | **% Cold Starts <6,000:** | 53.00 | |
| **% ADT <6,000 lbs:** | 85.50 | **Total VMT:** | 4,730,151 | **% Cold Starts >6,000:** | 51.77 | |
| **% ADT >6,000 lbs:** | 14.50 | | | | | |

| **Oxides of Sulfur Emissions** | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | **Total SOx Emissions (lbs/day)** |
|---|---|---|---|---|
| VMT <6,000 lbs | 4,049,009 | 0.05 | 202,450.46 | |
| VMT >6,000 lbs | 681,142 | 0.28 | 190,719.68 | **866.01** |

| **Lead Emissions** | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | **Total Lead Emissions (lbs/day)** |
|---|---|---|---|---|
| VMT <6,000 lbs | 4,049,009 | N/A | N/A | |
| VMT >6,000 lbs | 681,142 | 0.00040 | 272.45669 | **0.60** |

| **PM10 Emissions** | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Tire Wear Fac (g/mile) | Tire Wear Emis. (g/day) | **Total PM10 Emissions (lbs/day)** |
|---|---|---|---|---|---|---|
| VMT <6,000 lbs | 4,049,009 | 0.01 | 40,490.09 | 0.10 | 404,900.91 | |
| VMT >6,000 lbs | 681,142 | 0.33 | 224,776.77 | 0.18 | 122,605.51 | **1,746.20** |

| **Carbon Monoxide Emissions** | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Cold Start EF (g/trip) | Cold Start Emis. (g/day) | Hot Start EF (g/trip) | Hot Start Emis. (g/day) | **Total CO Emissions (lbs/day)** |
|---|---|---|---|---|---|---|---|---|
| VMT <6,000 lbs | 4,049,009 | 1.97 | 7,964,400.9 | 46.54 | 9,866,764.2 | 3.68 | 691,088.15 | |
| VMT >6,000 lbs | 681,142 | 6.12 | 4,171,311.89 | 25.37 | 890,824.46 | 2.60 | 84,922.09 | **52,135.05** |
| ADT <6,000 lbs | 400,055 | | | | | | | |
| ADT >6,000 lbs | 67,846 | | | | | | | |

| **Oxides of Nitrogen Emissions** | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Cold Start EF (g/trip) | Cold Start Emis. (g/day) | Hot Start EF (g/trip) | Hot Start Emis. (g/day) | **Total NOx Emissions (lbs/day)** |
|---|---|---|---|---|---|---|---|---|
| VMT <6,000 lbs | 4,049,009 | 0.23 | 947,468.13 | 1.14 | 240,652.78 | 0.25 | 46,066.28 | |
| VMT >6,000 lbs | 681,142 | 4.41 | 3,005,197.27 | 2.02 | 70,767.25 | 0.92 | 30,107.25 | **9,560.04** |
| ADT <6,000 lbs | 400,055 | | | | | | | |
| ADT >6,000 lbs | 67,846 | | | | | | | |

| **ROC Emissions** | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Cold Start EF (g/trip) | Cold Start Emis. (g/day) | Hot Start EF (g/trip) | Hot Start Emis. (g/day) | Hot Soak EF (g/trip) | Hot Soak Emis. (g/day) | Diurnal EF (g/trip) | Diurnal Emis. (g/day) | **Total ROC Emissions (lbs/day)** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VMT <6,000 lbs | 4,049,009 | 0.07 | 283,430.64 | 1.13 | 239,592.64 | 0.23 | 43,245.89 | 0.27 | 1,072,987.41 | 0.44 | 87,011.85 | |
| VMT >6,000 lbs | 681,142 | 0.78 | 527,884.83 | 1.24 | 43,549.08 | 0.36 | 11,781.10 | 0.36 | 245,211.02 | 1.12 | 37,993.48 | **5,710.77** |
| ADT <6,000 lbs | 400,055 | | | | | | | | | | | |
| ADT >6,000 lbs | 67,846 | | | | | | | | | | | |

Notes: ADT = Average Daily Trips, VMT = Vehicle Miles Traveled per day.

# Buildout Mobile Source Emissions Inventory - Redlands Alt. 4

**Input Parameters**

| | |
|---|---|
| **Project Name:** | Redlands GP |
| **Analysis Year:** | 2010 |
| **County:** | San Bernardino |
| **Area:** | 4 |
| **Trip Length Area** | San Bernardino |
| **Total ADT:** | 876,700 |

**Calculated Parameters**

| | | | | | | |
|---|---|---|---|---|---|---|
| **Work %:** | 38.88 | **Work Trip Length:** | 13.60 | **AM Speed:** | 27 | CO/NOx |
| **Non-Work %:** | 61.12 | **Non-Work Length:** | 7.90 | **Off Peak Speed:** | 35 | ROC |
| **Work ADT:** | 340,861 | **% VMT <6,000 lbs:** | 85.60 | **PM Speed:** | 20 | SOx/PM10/Pb |
| **Non-Work ADT:** | 535,839 | **% VMT >6,000 lbs:** | 14.40 | **% Cold Starts <6,000:** | 53.00 | |
| **% ADT <6,000 lbs:** | 85.50 | **Total VMT:** | 8,868,837 | **% Cold Starts >6,000:** | 51.77 | |
| **% ADT >6,000 lbs:** | 14.50 | | | | | |

**Oxides of Sulfur Emissions**

| | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | **Total SOx Emissions (lbs/day)** |
|---|---|---|---|---|
| VMT <6,000 lbs | 7,591,725 | 0.05 | 379,586.24 | |
| VMT >6,000 lbs | 1,277,113 | 0.28 | 357,591.53 | **1,623.74** |

**Lead Emissions**

| | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | **Total Lead Emissions (lbs/day)** |
|---|---|---|---|---|
| VMT <6,000 lbs | 7,591,725 | N/A | N/A | |
| VMT >6,000 lbs | 1,277,113 | 0.00040 | 510.84504 | **1.13** |

**PM10 Emissions**

| | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Tire Wear Fac (g/mile) | Tire Wear Emis. (g/day) | **Total PM10 Emissions (lbs/day)** |
|---|---|---|---|---|---|---|
| VMT <6,000 lbs | 7,591,725 | 0.01 | 75,917.25 | 0.10 | 759,172.49 | |
| VMT >6,000 lbs | 1,277,113 | 0.33 | 421,447.16 | 0.18 | 229,880.27 | **3,274.05** |

**Carbon Monoxide Emissions**

| | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Cold Start EF (g/trip) | Cold Start Emis. (g/day) | Hot Start EF (g/trip) | Hot Start Emis. (g/day) | **Total CO Emissions (lbs/day)** |
|---|---|---|---|---|---|---|---|---|
| VMT <6,000 lbs | 7,591,725 | 1.97 | 14,932,922.8 | 46.54 | 18,487,266.8 | 3.68 | 1,294,885.62 | |
| VMT >6,000 lbs | 1,277,113 | 6.12 | 7,821,037.54 | 25.37 | 1,669,129.73 | 2.60 | 159,117.76 | **97,718.86** |
| ADT <6,000 lbs | 749,579 | | | | | | | |
| ADT >6,000 lbs | 127,122 | | | | | | | |

**Oxides of Nitrogen Emissions**

| | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Cold Start EF (g/trip) | Cold Start Emis. (g/day) | Hot Start EF (g/trip) | Hot Start Emis. (g/day) | **Total NOx Emissions (lbs/day)** |
|---|---|---|---|---|---|---|---|---|
| VMT <6,000 lbs | 7,591,725 | 0.23 | 1,776,463.62 | 1.14 | 450,908.95 | 0.25 | 86,313.96 | |
| VMT >6,000 lbs | 1,277,113 | 4.41 | 5,634,620.77 | 2.02 | 132,595.96 | 0.92 | 56,411.69 | **17,923.60** |
| ADT <6,000 lbs | 749,579 | | | | | | | |
| ADT >6,000 lbs | 127,122 | | | | | | | |

**ROC Emissions**

| | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Cold Start EF (g/trip) | Cold Start Emis. (g/day) | Hot Start EF (g/trip) | Hot Start Emis. (g/day) | Hot Soak EF (g/trip) | Hot Soak Emis. (g/day) | Diurnal EF (g/trip) | Diurnal Emis. (g/day) | **Total ROC Emissions (lbs/day)** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VMT <6,000 lbs | 7,591,725 | 0.07 | 531,420.74 | 1.13 | 448,922.56 | 0.23 | 81,029.44 | 0.27 | 2,011,807.09 | 0.44 | 163,033.32 | |
| VMT >6,000 lbs | 1,277,113 | 0.78 | 989,762.26 | 1.24 | 81,597.51 | 0.36 | 22,074.14 | 0.36 | 459,760.53 | 1.12 | 71,188.04 | **10,706.16** |
| ADT <6,000 lbs | 749,579 | | | | | | | | | | | |
| ADT >6,000 lbs | 127,122 | | | | | | | | | | | |

Notes: ADT = Average Daily Trips, VMT = Vehicle Miles Traveled per day.

# Buildout Mobile Source Emissions Inventory - Redlands Alt. 5

| Input Parameters | |
|---|---|
| Project Name: | Redlands GP |
| Analysis Year: | 2010 |
| County: | San Bernardino |
| Area: | 4 |
| Trip Length Area | San Bernardino |
| Total ADT: | 830,000 |

| Calculated Parameters | | | | | | |
|---|---|---|---|---|---|---|
| Work %: | 38.88 | Work Trip Length: | 13.60 | AM Speed: | 27 | CO/NOx |
| Non-Work %: | 61.12 | Non-Work Length: | 7.90 | Off Peak Speed: | 35 | ROC |
| Work ADT: | 322,704 | % VMT <6,000 lbs: | 85.60 | PM Speed: | 20 | SOx/PM10/Pb |
| Non-Work ADT: | 507,296 | % VMT >6,000 lbs: | 14.40 | % Cold Starts <6,000: | 53.00 | |
| % ADT <6,000 lbs: | 85.50 | Total VMT: | 8,396,413 | % Cold Starts >6,000: | 51.77 | |
| % ADT >6,000 lbs: | 14.50 | | | | | |

| Oxides of Sulfur Emissions | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Total SOx Emissions (lbs/day) |
|---|---|---|---|---|
| VMT <6,000 lbs | 7,187,329 | 0.05 | 359,366.47 | |
| VMT >6,000 lbs | 1,209,083 | 0.28 | 338,543.36 | 1,537.25 |

| Lead Emissions | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Total Lead Emissions (lbs/day) |
|---|---|---|---|---|
| VMT <6,000 lbs | 7,187,329 | N/A | N/A | |
| VMT >6,000 lbs | 1,209,083 | 0.00040 | 483.63338 | 1.07 |

| PM10 Emissions | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Tire Wear Fac (g/mile) | Tire Wear Emis. (g/day) | Total PM10 Emissions (lbs/day) |
|---|---|---|---|---|---|---|
| VMT <6,000 lbs | 7,187,329 | 0.01 | 71,873.29 | 0.10 | 718,732.94 | |
| VMT >6,000 lbs | 1,209,083 | 0.33 | 398,997.54 | 0.18 | 217,635.02 | 3,099.64 |

| Carbon Monoxide Emissions | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Cold Start EF (g/trip) | Cold Start Emis. (g/day) | Hot Start EF (g/trip) | Hot Start Emis. (g/day) | Total CO Emissions (lbs/day) |
|---|---|---|---|---|---|---|---|---|
| VMT <6,000 lbs | 7,187,329 | 1.97 | 14,137,476.8 | 46.54 | 17,502,488.3 | 3.68 | 1,225,909.73 | |
| VMT >6,000 lbs | 1,209,083 | 6.12 | 7,404,427.01 | 25.37 | 1,580,218.64 | 2.60 | 150,641.88 | 92,513.57 |
| ADT <6,000 lbs | 709,650 | | | | | | | |
| ADT >6,000 lbs | 120,350 | | | | | | | |

| Oxides of Nitrogen Emissions | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Cold Start EF (g/trip) | Cold Start Emis. (g/day) | Hot Start EF (g/trip) | Hot Start Emis. (g/day) | Total NOx Emissions (lbs/day) |
|---|---|---|---|---|---|---|---|---|
| VMT <6,000 lbs | 7,187,329 | 0.23 | 1,681,835.07 | 1.14 | 426,889.96 | 0.25 | 81,716.20 | |
| VMT >6,000 lbs | 1,209,083 | 4.41 | 5,334,476.15 | 2.02 | 125,532.84 | 0.92 | 53,406.76 | 16,968.85 |
| ADT <6,000 lbs | 709,650 | | | | | | | |
| ADT >6,000 lbs | 120,350 | | | | | | | |

| ROC Emissions | VMT | Running EF (g/mile) | Run. Exhaust (g/day) | Cold Start EF (g/trip) | Cold Start Emis. (g/day) | Hot Start EF (g/trip) | Hot Start Emis. (g/day) | Hot Soak EF (g/trip) | Hot Soak Emis. (g/day) | Diurnal EF (g/trip) | Diurnal Emis. (g/day) | Total ROC Emissions (lbs/day) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VMT <6,000 lbs | 7,187,329 | 0.07 | 503,113.05 | 1.13 | 425,009.39 | 0.23 | 76,713.17 | 0.27 | 1,904,642.28 | 0.44 | 154,348.88 | |
| VMT >6,000 lbs | 1,209,083 | 0.78 | 937,039.67 | 1.24 | 77,250.98 | 0.36 | 20,898.30 | 0.36 | 435,270.04 | 1.12 | 67,396.00 | 10,135.86 |
| ADT <6,000 lbs | 709,650 | | | | | | | | | | | |
| ADT >6,000 lbs | 120,350 | | | | | | | | | | | |

Notes: ADT = Average Daily Trips, VMT = Vehicle Miles Traveled per day.

# Redlands General Plan Update
# Noise Element Technical Background Study

Endo Engineering

August 1, 1995

Endo Engineering     Traffic Engineering     Air Quality Studies     Noise Assessments

August 1, 1995

Mr. Paul DePalatis
Smith Peroni & Fox
960 Tahquitz Canyon Way - Suite 103
Palm Springs, CA 92262

***SUBJECT: City of Redlands General Plan Update and EIR Noise Technical Background Study***

Dear Mr. DePalatis;

Endo Engineering is pleased to submit this technical background report addressing existing and future noise levels throughout the City of Redlands for your use in preparing a General Plan update. The information provided herein will establish a foundation for the assessment of future noise impacts on the community and the development of planning and development strategies to minimize the potential for adverse impacts. The pages which follow document: (1) fundamentals of noise; (2) existing motor vehicle noise conditions; (3) future motor vehicle noise conditions; and (4) railroad and aircraft noise.

We trust that the information provided herein will be of immediate and continuing value to the City of Redlands. It is sufficiently detailed to be used in the preparation of the Master Environmental Assessment and the Environmental Impact Report for the General Plan update. Should questions or comments develop regarding the findings and recommendations within this report, please do not hesitate to contact our offices at (714) 768-4333.

Cordially,
ENDO ENGINEERING

Vicki Lee Endo

Vicki Lee Endo
Registered Professional
Traffic Engineer TR 1161

REGISTERED PROFESSIONAL ENGINEER
VICKI LEE ENDO
TR 1161
12/31/98
TRAFFIC
STATE OF CALIFORNIA

95 Argonaut - Suite 115, Aliso Viejo, California 92656-1487
(714) 768-4333    FAX (714) 768-0718

# Table of Contents


| Section | Title | Page |
|---|---|---|
| 1.0 | CURRENT MOTOR VEHICLE NOISE LEVELS ......... | 1-1 |
| | - Fundamentals of Noise<br>- Harmful Effects of Noise<br>- Community Responses to Sound<br>- Land Use Compatibility With Noise<br>- Existing Traffic Noise Levels | |
| 2.0 | FUTURE MOTOR VEHICLE NOISE ......................... | 2-1 |
| | - Factors Affecting Roadway Noise<br>- Future Traffic Noise Levels<br>- Typical and Design Noise Levels | |
| 3.0 | RAILROAD AND AIRCRAFT NOISE ....................... | 3-1 |
| 4.0 | FINDINGS AND CONCLUSIONS ........................... | 4-1 |
| | APPENDIX | |
| | - Redlands Land Use Compatibility Standards<br>- RD-77-108 Noise Assumptions<br>- Train Noise Worksheet | |

# List of Figures


| Number | Title | Following Page |
|---|---|---|
| 1-1 | Typical Noise Levels of Familar Sources | 1-1 |
| 1-2 | Speech Communication as a Function of Background Noise Level | 1-3 |
| 1-3 | Land Use Compatibility for Community Noise Environments | 1-4 |
| 2-1 | Typical Noise Levels Versus Speed and Volume for Major Arterials | 2-6 |
| 2-2 | Typical Noise Levels Versus Speed and Volume for Minor Arterials and Collectors | 2-6 |
| 2-3 | Effects of Truck Mix on CNEL at 45 mph | 2-6 |
| 2-4 | Design Noise Levels for the City of Redlands | 2-6 |
| 3-1 | Redlands Municipal Airport 1992 Noise Contours | 3-1 |
| 3-2 | Redlands Municipal Airport 2015 Noise Contours | 3-1 |

# List of Tables


| Number | Title | Page |
|---|---|---|
| 1-1 | Harmful Effects of Noise | 1-3 |
| 1-2 | Current Exterior Noise Exposure | 1-6 |
| 2-1 | General Plan Build-out Exterior Noise Levels | 2-2 |
| 2-2 | Increase in Motor Vehicle Noise | 2-4 |

# 1.0 CURRENT MOTOR VEHICLE NOISE LEVELS

## 1.1 Fundamentals of Noise

Noise levels are measured on a logarithmic scale in decibels which are then weighted and added over a 24-hour period to reflect not only the magnitude of the sound, but also its duration, frequency, and time of occurrence. In this manner, various acoustical scales and units of measurement have been developed such as: equivalent sound levels (Leq), day-night average sound levels (Ldn) and community noise equivalent levels (CNEL's).

A-weighted decibels (dBA) approximate the subjective response of the human ear to a broad frequency noise source by discriminating against the very low and high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies which are audible to the human ear. The decibel scale has a value of 1.0 dBA at the threshold of hearing and 140 dBA at the threshold of pain. Each interval of 10 decibels indicates a sound energy ten times greater than before, which is perceived by the human ear as being roughly twice as loud. Therefore, a 1.0 decibel increase is just audible whereas a 10 decibel increase means the sound is perceived as being twice as loud as before.

Examples of the decibel level of various noise sources are shown in Figure 1-1. They include: the quiet rustle of leaves (10 dBA), a motion picture studio (20 dBA), a library (35 dBA), ambient noise outdoors (50 dBA), normal conversation at 5 feet (55 dBA), or a busy street at 50 feet (75 dBA).

### Noise Rating Schemes

Equivalent sound levels are not measured directly but rather calculated from sound pressure levels typically measured in A-weighted decibels (dBA). The equivalent sound level (Leq) is the constant level that, over a given time period, transmits the same amount of acoustic energy as the actual time-varying sound. Equivalent sound levels are the basis for both the Ldn and CNEL scales.

Day-night average sound levels are a measure of the cumulative noise exposure of the community. The Ldn value results from a summation of hourly Leq's over a 24-hour time period with an increased weighting factor applied to the nighttime period between 10:00 pm and 7:00 am. This noise rating scheme takes into account those subjectively more annoying noise events which occur during the normal sleeping hours.

Community noise equivalent levels (CNEL) also carry a weighting penalty for noises that occur during the nighttime hours. In addition, CNEL levels include a penalty for noise events that occur during the evening hours between 7:00 pm and 10:00 pm. Because of the weighting factors applied, CNEL values at a given location will always be larger than Ldn values, which in turn will exceed Leq values. However, CNEL values are typically within one decibel of the day-night average sound level.

### Sound Propagation

For a "line source" of noise such as a heavily traveled roadway, the noise level drops off by a nominal value of 3.0 decibels for each doubling of distance between the noise source and noise receiver. Environmental factors such as the wind direction and speed, temperature gradients, the characteristics of the ground (hard or soft) and the air (relative humidity), the presence of grass, shrubbery, and trees, combine to increase the typical attenuation achieved outside laboratory conditions to 4.5 decibels per doubling of distance.

## Figure 1-1

## Typical Noise Levels of Familiar Sources

| | dBA | |
|---|---|---|
| | 145 | |
| Physically Painful | 140 | Sonic Boom |
| Extremely Loud | 135 | |
| | 130 | |
| | 125 | Jet Takeoff at 200' |
| Discomforting | 120 | Oxygen Torch |
| | 115 | Discotheque |
| | 110 | Construction Noise at 3 meters |
| | 105 | Power Mower at 3' |
| Very Loud | 100 | Newspaper Press, Subway Train |
| | 95 | Freight Train at 50' |
| | 90 | Food Blender |
| | 85 | Electric Mixer, Alarm Clock |
| | 80 | Heavy Truck at 50', Average Factory |
| | 75 | Busy Street Traffic at 50' |
| | 70 | Average Traffic at 100', Vacuum Cleaner at 10' |
| Loud | 65 | Electric Typewriter at 10' |
| | 60 | Dishwasher at 10', Air Conditioning Unit at 15' |
| | 55 | Normal Conversation at 5' |
| Quiet | 50 | Typical Daytime Suburban Background, Quiet Office |
| | 45 | Refrigerator at 10' |
| | 40 | Bird Calls |
| | 35 | Library |
| Very Quiet | 30 | Soft Whisper at 5 meters |
| | 25 | |
| | 20 | Motion Picture Studio |
| | 15 | |
| Barely Audible | 10 | Leaves Rustling |
| | 5 | |
| Threshold of Hearing | 0 | |

*Endo Engineering*

Sources: Tipler, Pav L.A. "Physics", New York: Worth Publishers, 1976.

This is particularly true: (1) for freeways where an elevated profile, higher truck mix, or the presence of intervening buildings or topography often come into play; and (2) where the view of a roadway is interrupted by isolated buildings, clumps of bushes, scattered trees, or the intervening ground is soft or covered with vegetation and the source or receiver is located more than three meters above the ground. It should be noted, however, that the nominal value of 3.0 dBA with doubling applies to sound propagation from a "line source": (1) over the top of a barrier greater than 3 meters in height, or (2) where there is a clear unobstructed view of the highway, the ground is hard, there are no intervening structures and the height of the line-of-sight between the noise source and the noise receiver averages more than 3 meters above the ground.[1]

In an area which is relatively flat and free of barriers, the sound level resulting from a single "point source" of noise drops by 6 decibels for each doubling of distance or 20 decibels for each factor of ten in distance. This applies to fixed noise sources and mobile noise sources which are temporarily stationary such as an idling truck or other heavy duty equipment operating within a confined area (such as industrial processes). Sound propagation from a train resembles a "line source" near the railroad tracks and a point source at distances beyond three-tenths of the train length.

The noise levels adjacent to line sources such as roadways increase by 3.0 dBA with each doubling in the traffic volume (provided that the speed and truck mix do not change). From the mathematical expression relating increases in the number of noise sources (motor vehicles) to the increase in the adjacent noise level, it can be shown that a 26 percent increase in the traffic volume will cause a 1.0 dBA increase in adjacent noise levels. Doubling the number of vehicles on a given route increases the adjacent noise levels by 3.0 dBA, but changing the vehicle speed has an even more dramatic effect.

Air temperature and humidity seldom have a significant effect on adjacent noise contours. Temperature gradients can bend or reflect noise back down to earth (usually at distances exceeding one-half mile). Wind speed and wind direction have an effect on the noise levels, but the effects are not consistent. Sound traveling with the wind is bent down to earth and sound traveling against the wind is bent upwards above the earth. Although irregular, turbulent or gusty winds cause fluctuations in sound transmissions, standard noise modeling practice does not account for any of these factors in steady state noise control.

Atmospheric effects seldom have any significant effect on noise levels at the relatively short distances from the highway to the adjacent residents. Although in some instances short duration intermittent or temporary atmospheric effects can be significant, these are not taken into account for steady-state noise control. Moreover, any small effect created by these factors would be masked by larger variations due to topography, ground absorption, vehicular speed, and roadway alignment. For example, variations in humidity can change the actual distance to a particular noise contour by as much as 6 feet, if it is located through computer modelling 800 feet from the roadway.

### 1.2 Harmful Effects of Noise

Noise can cause temporary physical and psychological responses in humans. Temporary physical reactions to passing noises range from a startle reflex to constriction in peripheral blood vessels, the secretion of saliva and gastric juices, and changes in heart rate, breathing patterns, the chemical composition of the blood and urine, the dilation of the pupils of the eye, visual acuity and equilibrium. The chronic recurrence of these physical reactions has

---

1. State of California, Department of Transportation, "Noise Manual", 1980.

been shown to aggravate headaches, cause fatigue, digestive disorders, heart disease, circulatory and equilibrium disorders. Moreover, as a source of stress, noise is a causal factor in stress-related ailments such as ulcers, high blood pressure and anxiety.

Three harmful effects of noise which are commonly of concern include speech interference, the prevention or interruption of sleep, and hearing loss. Figure 1-2 illustrates how excessive background noises can reduce the amount and quality of verbal exchange and thereby impact education, family life-styles, occupational efficiency, and the quality of recreation and leisure time. Speech interference begins to occur at about 40 to 45 decibels and becomes severe at about 60 decibels. Background noise levels affect performance and learning processes through distraction, reduced accuracy, increased fatigue, annoyance and irritability, and the inability to concentrate ( particularly when complex tasks are involved or in schools where younger children exhibit imprecise speech patterns and short concentration spans).

Several factors determine whether or not a particular noise event will interfere with or prevent sleep. These factors include the noise level and characteristics, the stage of sleep, the individual's age and motivation to waken. Ill or elderly people are particularly susceptible to noise-induced sleep interference, which can occur when intruding noise levels exceed the typical 35-45 decibel background noise level in bedrooms. Sleep prevention can occur when intruding noise levels exceed 50 dBA.

Hearing loss, which may begin to occur at 75 dBA (as shown in Table 1-1), is one of the most harmful effects of noise on people. Approximately 20 million people in the United States currently have some degree of hearing loss. In many of these cases, exposures to very loud, impulsive, or sustained noises caused damage to the inner ear which was substantial even before a hearing loss was actually noticed. To prevent the spread of hearing loss, a desirable goal would be to minimize the number of noise sources which expose people to sound levels above 70 decibels.

Table 1-1
Harmful Effects Of Noise[1]

| Harmful Effect | Noise Levels At Which Harmful Effect Occurs |
|---|---|
| Prevention or Interruption of Sleep | 35 - 45 dB (A) |
| Speech Interference | 50 - 60 dB (A) |
| Extra Auditory Physiological Effects | 65 - 75 dB (A) |
| Hearing Loss | 75 - 85 dB (A) |

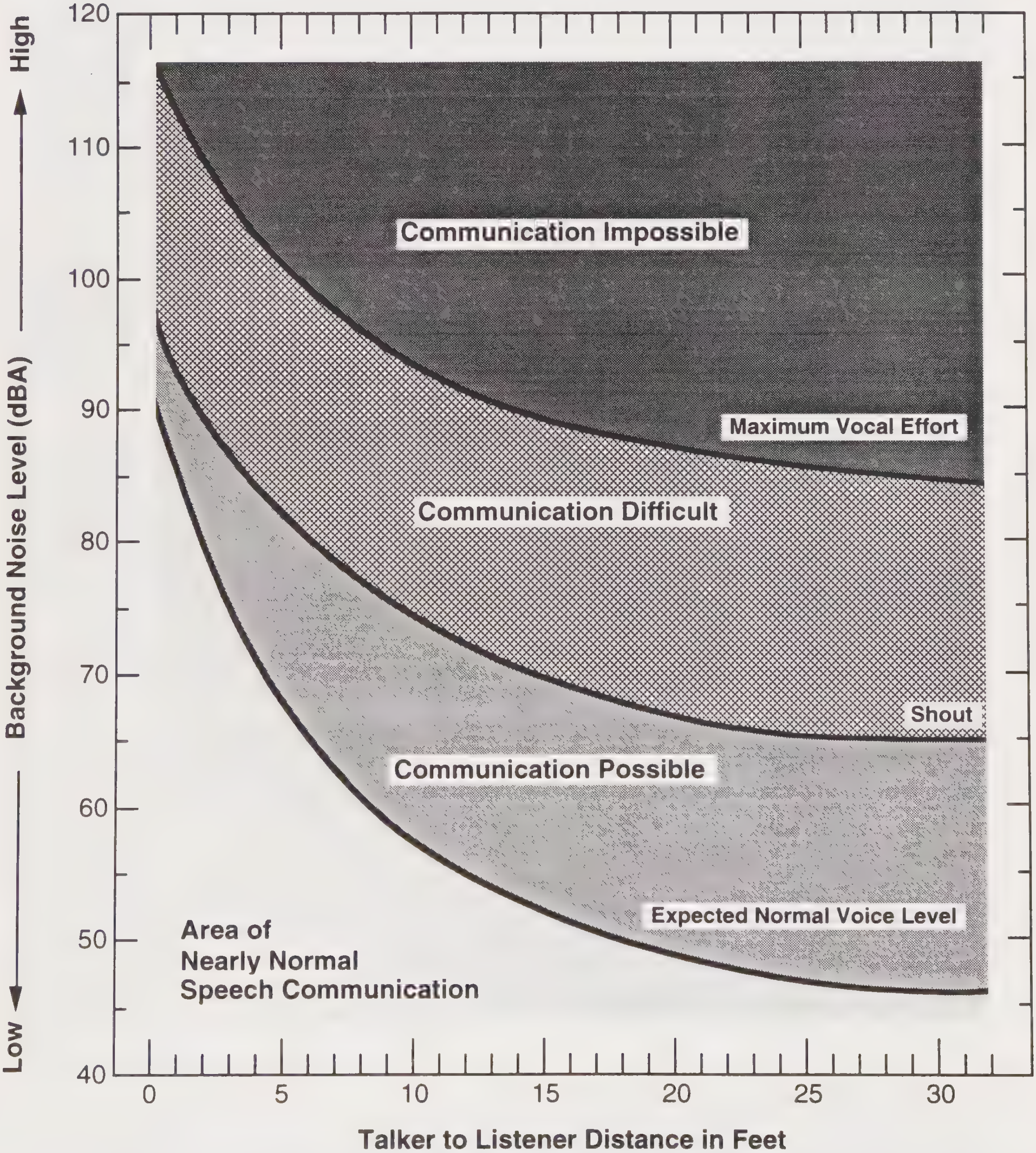
1. Source: California Department of Public Health, "Report to 1971 Legislature".

### 1.3 Community Responses to Sound

Approximately 10 percent of the population has a very low tolerance for noise and will object to any noise not of their own making. Consequently, even in the quietest environment, some complaints will occur. Another 25 percent of the population will not

Figure 1-2

Speech Communication as a Function of Background Noise Level




Source: Miller, "Effects of Noise on People", Journal of Acoustical Society of America, V.56, No.3, 9/74

Endo Engineering

complain even in very severe noise environments.[2] Thus, a variety of reactions can be expected from people exposed to any given noise environment.

Despite this variability in behavior on an individual level, the population as a whole can be expected to exhibit the following responses to changes in noise levels: an increase or decrease of 1.0 dBA cannot be perceived except in carefully controlled laboratory experiments; a 3.0 dBA increase is considered just noticeable outside of the laboratory; an increase of 5.0 dBA is often necessary before any noticeable change in community response (i.e. complaints) would be expected.[3]

Community responses to noise may range from registering a complaint by telephone or letter, to initiating court action, depending upon each individual's susceptibility to noise and personal attitudes about noise. Several factors are related to the level of community annoyance including: (1) fear associated with the noise producing activities; (2) socio-economic status and educational level of the residents; (3) resident conviction that they are being fairly treated; (4) attitudes regarding the usefulness of the noise producing activity; and (5) resident belief that the noise source can be controlled.[4]

Recent studies have shown that changes in long-term noise levels measured in units of Ldn or CNEL, are noticeable and are responded to by people. About 10 percent of the people exposed to traffic noise of 60 Ldn will report being highly annoyed with the noise, and each increase of one Ldn is associated with approximately 2 percent more people being highly annoyed. When traffic noise exceeds 60 Ldn or aircraft noise exceeds 55 Ldn, people begin complaining.[5] Group or legal actions to stop the noise should be expected to begin at traffic noise levels near 70 Ldn and aircraft noise levels near 65 Ldn.

### 1.4 Land Use Compatibility with Noise

As ambient noise levels affect the perceived amenity or livability of a development, so too can the mismanagement of noise impacts impair the economic health and growth potential of a community by reducing the area's desirability as a place to live, shop and work. For this reason, land use compatibility with the noise environment is an important consideration in the planning and design process.

Relevant Noise Standards

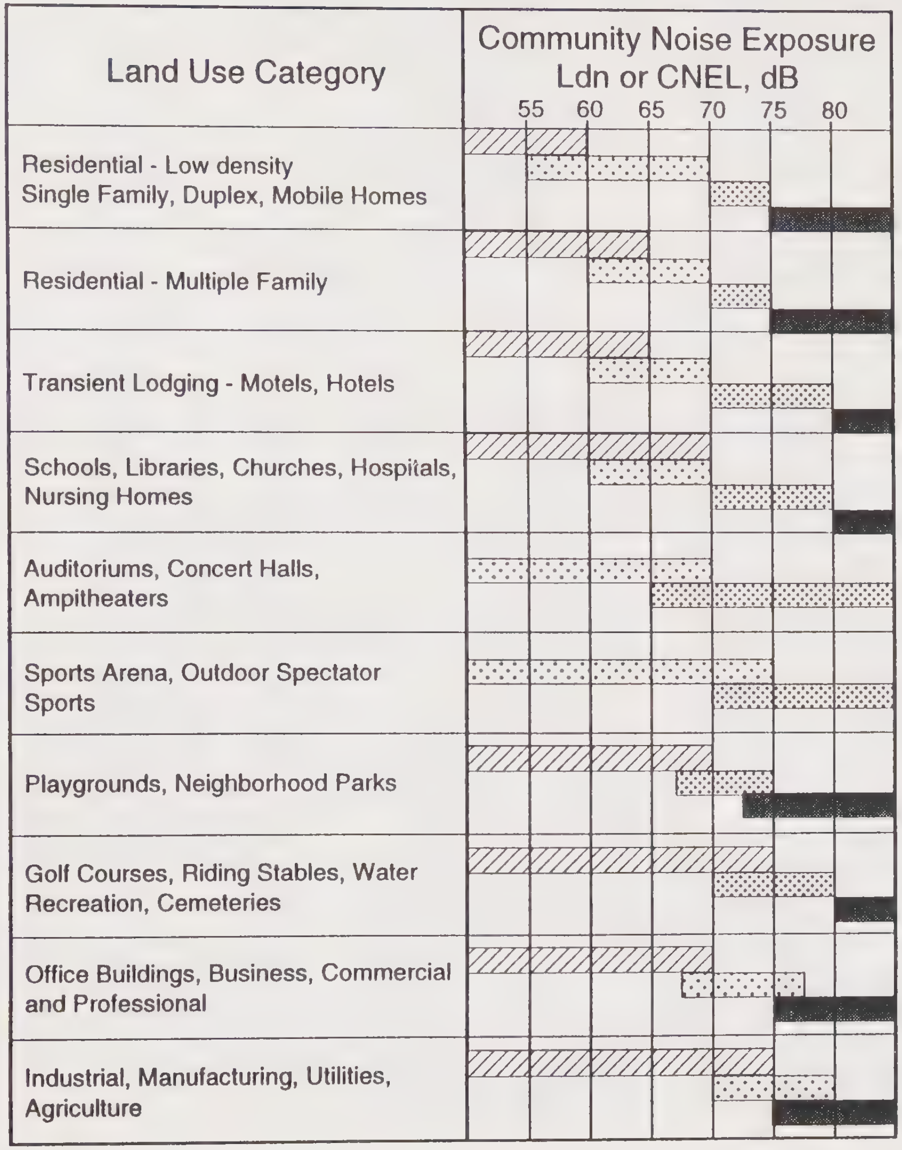
Some land uses are more tolerant of noise than others. For example, schools, hospitals, churches and residences are more sensitive to noise intrusion than commercial or industrial activities. Figure 1-3 is a land use compatibility chart for community noise which has been included in the California Department of Health Services document *Guidelines For the Preparation and Content of the Noise Element of the General Plan* (Revised 1987).. It diagrammatically identifies "normally acceptable", "conditionally acceptable", "normally unacceptable" and "clearly unacceptable" noise levels for various land use types. As shown therein, single family and multi-family homes are "normally acceptable" in exterior noise environments up to 60 CNEL and "conditionally acceptable" up to 65 CNEL. Schools, libraries, hospitals, convalescent facilities, and churches are "normally

---

2. Bolt Beranek & Newman, "Literature Survey for the FHA Contract on Urban Noise", Report No. 1460, January 1967.
3. State of California, Department of Health Services, Dr. Jerome Lukas, Memo dated July 11, 1984.
4. United States Environmental Protection Agency, "Public Health and Welfare Criteria For Noise", July 1973.
5. State of California, Department of Transportation, "Noise Manual", 1980 and Highway Research Board, "National Cooperative Highway Research Program Report 117", 1971.

## Figure 1-3

## Land Use Compatibility for Community Noise Environments




### Interpretation

**Normally Acceptable**

Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements

**Conditionally Acceptable**

New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

**Normally Unacceptable**

New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made with needed noise insulation features included in the design.

**Clearly Unacceptable**

New construction or development should generally not be undertaken.

*Endo Engineering*

Source: California Department of Health Services, "Guidelines for the Preparation and Content of the Noise Element of the General Plan," 1990

acceptable" up to 70 CNEL. Industrial uses are "normally acceptable" up to 75 CNEL, as are office buildings and business, commercial, and professional uses.

A "conditionally acceptable" designation implies that new construction or development should be undertaken only after a detailed analysis of the noise reduction requirements for each land use type is made and needed noise insulation features are incorporated in the design. By comparison, a "normally acceptable" designation indicates that conventional construction can occur with no special noise reduction requirements. Currently adopted land use compatibility guidelines and noise standards for the City of Redlands are included in the Appendix.

## 1.5 Existing Traffic Noise Levels

Noise from motor vehicles is generated by the engine vibrations, the interaction between the tires and the road, and the exhaust system. Reducing the speed of motor vehicles reduces the noise exposure of listeners inside the vehicle and those adjacent to the roadway.

The Highway Traffic Noise Prediction Model developed by the Federal Highway Administration (RD-77-108) and currently being applied throughout the nation was used to evaluate current noise conditions in the City of Redlands. This model accepts various parameters including: the traffic volume, vehicle mix and speed, and roadway geometry, in computing equivalent noise levels during typical daytime, evening and nighttime hours[6]. The resultant hourly noise levels are weighted, summed over 24 hours, and output as the CNEL value. Various CNEL contours are subsequently located through a series of computerized iterations designed to isolate the 60, 65, and 70 CNEL contour locations for planning purposes.

Table 1-2 provides the current noise levels adjacent to roadways within the City of Redlands. As shown in Table 1-2, the existing noise levels at 100 feet range from a low of 53.1 CNEL along Palmetto to a high of 79.4 CNEL along Interstate 10. Roadway volumes and lane geometrics were provided by DKS Associates. Noise levels were determined at 100 feet from the centerline of each roadway. The assumptions utilized for noise modeling purposes are provided in the Appendix.

Sensitive receptors including: hotels, motels, churches, schools, libraries, hospitals, and nursing homes are unacceptable in exterior environments which exceed 70 CNEL, as shown in Figure 1-3. Single-family and multi-family residences are unacceptable in exterior environments in excess of 65 CNEL. While exterior noise levels near 70 CNEL are not necessarily desirable exposures for sensitive receptors, the 70 CNEL maximum criteria developed by the State Office of Noise Control serves as a general guideline for identifying community noise problems.

Under existing conditions, very few areas within the City experience ambient noise levels in excess of 70 CNEL, other than adjacent to the freeways. From the noise levels provided in Table 1-2, it can be seen that the 70 dBA contour falls within the right-of-way along eighty-one percent of the surface streets analyzed. Single-family and multi-family residences located within this area may experience unacceptable noise levels.

---

6. This computer model does not include input parameters related to atmospheric conditions, since they seldom have any significant effect on noise levels at the relatively short distances form the roadway to adjacent residences.

Table 1-2
Existing Exterior Noise Exposure

| Roadway | A.D.T.[a] (Veh/Day) | CNEL[b] @ 100 Feet | Distance to Contours (Ft.)[c] 70 dBA | 65 dBA | 60 dBA |
|---|---|---|---|---|---|
| **Interstate 10** | | | | | |
| Mtn View-California | 138,000 | 79.4 | 352 | 752 | 1615 |
| California-Alabama | 140,000 | 79.4 | 352 | 752 | 1615 |
| Alabama-SR 30 | 140,000 | 79.4 | 352 | 752 | 1615 |
| SR 30-Orange | 130,000 | 78.7 | 318 | 675 | 1451 |
| Orange-University | 104,000 | 77.6 | 290 | 619 | 1332 |
| University-Cypress | 87,000 | 76.8 | 258 | 548 | 1178 |
| Cypress-Ford | 90,000 | 76.9 | 261 | 557 | 1196 |
| Ford-Redlands | 82,000 | 76.5 | 246 | 524 | 1125 |
| Redlands-Wabash | 87,000 | 76.8 | 258 | 548 | 1178 |
| Wabash-Yucaipa | 88,000 | 77.1 | 269 | 574 | 1234 |
| **State Route 30** | | | | | |
| I–10-San Bernardino | 46,000 | 73.2 | 158 | 334 | 717 |
| **Palmetto** | | | | | |
| California-Alabama | 1,000 | 52.1 | R/W | R/W | R/W |
| **San Bernardino Ave.** | | | | | |
| Mtn View-Alabama | 4,000 | 58.1 | R/W | R/W | 75 |
| Alabama-Orange | 8,000 | 61.8 | R/W | 61 | 132 |
| Orange-Church | 11,000 | 62.5 | R/W | 68 | 147 |
| Church-Wabash | 3,000 | 56.8 | R/W | R/W | 61 |
| Wabash-Mill Creek | 2,000 | 55.1 | R/W | R/W | 47 |
| **Lugonia Ave./Mentone Blvd.** | | | | | |
| Mtn View-Alabama | 3,000 | 56.8 | R/W | R/W | 61 |
| Alabama-Orange | 7,000 | 60.5 | R/W | R/W | 108 |
| Orange-Wabash | 12,000 | 63.0 | R/W | 75 | 157 |
| Wabash-Garnet | 8,000 | 61.2 | R/W | 58 | 120 |
| **Redlands Blvd.** | | | | | |
| California-Alabama | 20,000 | 66.0 | 58 | 116 | 244 |
| Alabama-Colton | 21,000 | 66.2 | 60 | 119 | 252 |
| Colton-Texas | 19,000 | 65.7 | 56 | 111 | 234 |
| Texas-Citrus | 27,000 | 67.3 | 69 | 140 | 298 |
| Citrus-Highland | 16,000 | 65.0 | R/W | 100 | 210 |
| Highland-I–10 Fwy | 8,000 | 62.0 | R/W | 66 | 134 |
| **Colton Ave.** | | | | | |
| Sixth-University | 10,000 | 62.1 | R/W | 64 | 138 |
| University-Dearborn | 8,000 | 61.1 | R/W | 55 | 118 |
| Dearborn-Crafton | 6,000 | 59.8 | R/W | 45 | 97 |
| **Barton/Brookside/Citrus** | | | | | |
| California-Terracina | 16,000 | 65.0 | R/W | 100 | 210 |
| Terracina-Orange | 14,000 | 63.7 | R/W | 83 | 173 |
| Orange-Judson | 13,000 | 64.0 | R/W | 86 | 183 |
| Judson-Wabash | 16,000 | 64.9 | 48 | 99 | 209 |
| Wabash-Crafton | 4,000 | 58.8 | R/W | R/W | 83 |

a. A.D.T. means current average daily two-way traffic volume.
b. CNEL values are given at 100 feet from all roadway centerlines (see the Appendix for assumptions).
c. All distances are measured from the centerline. R/W means the contour falls within the right-of-way.

Table 1-2 (Continued)
Existing Exterior Noise Exposure

| Roadway | A.D.T.[a] (Veh/Day) | CNEL[b] @ 100 Feet | Distance to Contours (Ft.)[c] 70 dBA | 65 dBA | 60 dBA |
|---|---|---|---|---|---|
| **Cypress Ave.** | | | | | |
| Terracina-Citrus | 9,000 | 62.4 | R/W | 68 | 143 |
| **California St.** | | | | | |
| Palmetto-Lugonia | 1,000 | 52.1 | R/W | R/W | R/W |
| Lugonia-Redlands | 4,000 | 58.1 | R/W | R/W | 75 |
| Redlands-Barton | 7,000 | 60.5 | R/W | R/W | 108 |
| **Nevada** | | | | | |
| San Bernardino-Lugonia | 1,000 | 52.1 | R/W | R/W | R/W |
| Lugonia-Redlands | 4,000 | 58.1 | R/W | R/W | 75 |
| Redlands-Barton | 1,000 | 52.1 | R/W | R/W | R/W |
| **Alabama St./Palm** | | | | | |
| North of S. Bernardino | 11,000 | 63.4 | R/W | 80 | 165 |
| S.Bernardino-I–10 Fwy | 15,000 | 64.7 | R/W | 96 | 201 |
| I–10 Fwy-Redlands | 27,000 | 67.3 | 69 | 140 | 298 |
| Redlands-Barton | 21,000 | 66.2 | 60 | 119 | 252 |
| **Tennessee/San Mateo** | | | | | |
| Lugonia-Brookside | 14,000 | 64.3 | 45 | 90 | 191 |
| Brookside-Highland | 9,000 | 62.4 | R/W | 68 | 143 |
| **Texas/Center** | | | | | |
| Pioneer-Colton | 4,000 | 58.1 | R/W | R/W | 75 |
| Colton-Brookside | 11,000 | 63.3 | R/W | 78 | 164 |
| **Eureka St.** | | | | | |
| Pearl-Citrus | 4,000 | 58.1 | R/W | R/W | 75 |
| **Orange St./Cajon** | | | | | |
| North of Pioneer | 4,000 | 58.8 | R/W | R/W | 83 |
| Pioneer-Lugonia | 7,000 | 61.2 | R/W | 56 | 120 |
| Lugonia-I–10 Fwy | 17,000 | 64.5 | 46 | 93 | 197 |
| I–10 Fwy-Citrus | 22,000 | 65.6 | 53 | 109 | 233 |
| Citrus-Highland | 12,000 | 62.9 | R/W | 73 | 156 |
| **Judson St./Ford St.** | | | | | |
| Pioneer-Colton | 2,000 | 55.1 | R/W | R/W | 47 |
| Colton-I–10 Fwy. | 5,000 | 59.7 | R/W | 45 | 96 |
| **Wabash Ave.** | | | | | |
| Pioneer-Lugonia | 2,000 | 55.1 | R/W | R/W | 47 |
| Lugonia-Citrus | 6,000 | 59.8 | R/W | 45 | 97 |
| Citrus-I–10 Fwy. | 2,000 | 55.1 | R/W | R/W | 47 |
| **Crafton** | | | | | |
| San Bernardino-5th | 6,000 | 59.8 | R/W | 45 | 97 |
| **Sand Canyon** | | | | | |
| East of Crafton | 7,000 | 60.6 | R/W | 53 | 109 |
| **San Timoteo Cyn. Road** | | | | | |
| Brookside-Allesandro | 3,000 | 57.5 | R/W | R/W | 68 |

a. A.D.T. means current average daily two-way traffic volume.
b. CNEL values are given at 100 feet from all roadway centerlines (see the Appendix for assumptions).
c. All distances are measured from the centerline. R/W means the contour falls within the right-of-way.

Office buildings, retail commercial areas and industrial facilities are considered normally unacceptable in exterior noise environments which exceed of 75 CNEL. From the noise contours provided in Table 1-2, it is unlikely that any areas of the City of Redlands are exposed to noise above this level as a result of motor vehicle noise.

## 2.0 FUTURE ROADWAY NOISE

### 2.1 Factors Affecting Roadway Noise

Noise levels adjacent to roadways vary with the volume of traffic, the mean vehicular speed, the truck mix, and the road cross-section. For instance, increasing the vehicle speed from 35 to 45 mph along a major roadway raises the adjacent noise levels approximateiy 2.7 dBA. Raising the speed from 45 to 50 mph increases adjacent noise levels by 1.0 dBA. A speed increase from 50 mph to 55 mph increases adjacent noise levels by 0.9 dBA. Consequently, lowering motor vehicle speeds can have a significant positive impact in terms of reducing adjacent noise levels.[1]

The truck mix on a given roadway also has a significant effect on the adjacent noise levels. As the number of trucks increases and becomes a larger percentage of the total vehicle volume, the adjacent noise levels increase. This effect is more pronounced if the number of heavy duty (3+ axle) trucks is large when compared to the number of medium duty (2 axle) trucks.

### 2.2 Future Traffic Noise Levels

The traffic impacts associated with the proposed General Plan were assessed with a computerized traffic model by DKS Associates, Inc. Based upon their findings, build-out noise levels were projected for the proposed General Plan adjacent to 57 surface street links and 12 freeway links in the City of Redlands Planning Area.

The projections indicate that some of the links that are expected to experience a significant increase in traffic volumes will exhibit lower average vehicle speeds that offset, to some extent, the noise increases that would otherwise be expected. The noise levels generated by motor vehicles increase as their speed increases. The maximum noise levels on a roadway link are therefore determined from the speed and the number of vehicles using the roadway link. When a roadway link is extremely congested, speeds are lower and noise levels will be lower than when a free-flow condition is achieved. The analysis herein represents a "worst cast" scenario since 45 mph speeds were assumed for all future surface streets evaluated and the noise levels projected for the most congested links may never be realized if congested speeds drop below 45 mph.

Table 2-1 provides the traffic noise levels along the City's freeways and arterials upon buildout of the proposed General Plan. Assuming a sound propagation rate of 4.5 dBA with each doubling of distance, the locations of the future 70 CNEL, 65 CNEL and 60 CNEL noise contours used for land use compatibility purposes have been determined. The computer model input parameters assumed for the buildout analyses are detailed in the Appendix.

Table 2-2 shows the increase in noise levels from current to General Plan buildout. The increase in noise levels experienced by sensitive noise receptors adjacent to 28 of the 64 arterial streets evaluated will exceed the four or more dB defined by Policy 9v as "significant".

---

. Source: Endo Engineering conclusions based upon computer runs of RD-77-108 with all variables held constant except vehicle speed.

Table 2-1
General Plan Buildout Exterior Noise Exposure
Adjacent to City Roadways

| Roadway | A.D.T.[a] (Veh/Day) | CNEL[b] @ 100 Feet | Distance to Contours (Ft.)[c] 70 dBA | 65 dBA | 60 dBA |
|---|---|---|---|---|---|
| **Interstate 10** | | | | | |
| Mtn View-California | 238,000 | 82.6 | 505 | 1081 | 2325 |
| California-Alabama | 235,000 | 82.5 | 498 | 1065 | 2290 |
| Alabama-SR 30 | 205,000 | 81.9 | 455 | 971 | 2089 |
| SR 30-Orange | 208,000 | 80.8 | 435 | 931 | 2002 |
| Orange-University | 206,000 | 81.1 | 455 | 974 | 2097 |
| University-Cypress | 195,000 | 80.8 | 435 | 931 | 2002 |
| Cypress-Ford | 198,000 | 80.9 | 442 | 945 | 2033 |
| Ford-Redlands | 210,000 | 81.2 | 462 | 989 | 2129 |
| Redlands-Wabash | 186,000 | 80.6 | 422 | 903 | 1942 |
| Wabash-Yucaipa | 180,000 | 80.7 | 428 | 917 | 1972 |
| **State Route 30** | | | | | |
| I-10-San Bernardino | 85,000 | 75.9 | 236 | 504 | 1084 |
| North of San Bernardino | 92,000 | 75.1 | 209 | 446 | 959 |
| **Palmetto** | | | | | |
| California-Alabama | 19,000 | 65.0 | 49 | 100 | 213 |
| **San Bernardino Ave.** | | | | | |
| Mtn View-Alabama | 33,000 | 67.7 | 75 | 145 | 304 |
| Alabama-Orange | 51,000 | 70.3 | 104 | 212 | 451 |
| Orange-Church | 25,000 | 66.2 | 60 | 119 | 252 |
| Church-Wabash | 24,000 | 66.0 | 56 | 116 | 248 |
| Wabash-Mill Creek | 12,000 | 63.0 | R/W | 75 | 157 |
| **Lugonia Ave./Mentone Blvd.** | | | | | |
| Mtn View-Alabama | 30,000 | 67.0 | 66 | 134 | 285 |
| Alabama-Orange | 36,000 | 67.8 | 73 | 151 | 322 |
| Orange-Wabash | 22,000 | 65.6 | 53 | 109 | 233 |
| Wabash-Garnet | 19,000 | 65.0 | 49 | 100 | 213 |
| **Redlands Blvd.** | | | | | |
| California-Alabama | 39,000 | 69.2 | 90 | 180 | 382 |
| Alabama-Colton | 53,000 | 70.5 | 107 | 219 | 465 |
| Colton-Texas | 33,000 | 68.4 | 82 | 160 | 338 |
| Texas-Citrus | 30,000 | 67.7 | 72 | 149 | 317 |
| Citrus-Highland | 32,000 | 68.0 | 75 | 155 | 332 |
| Highland-I-10 Fwy | 22,000 | 66.4 | 61 | 123 | 260 |
| **Colton Ave.** | | | | | |
| Redlands-Sixth | 23,000 | 66.5 | 60 | 125 | 267 |
| Sixth-University | 12,000 | 62.9 | R/W | 73 | 156 |
| University-Dearborn | 11,000 | 62.5 | R/W | 68 | 147 |
| Dearborn-Crafton | 9,000 | 61.6 | R/W | 60 | 128 |
| **Barton/Brookside/Citrus** | | | | | |
| California-Terracina | 33,000 | 68.4 | 82 | 160 | 338 |
| Terracina-Orange | 27,000 | 66.6 | 63 | 126 | 268 |
| Orange-Judson | 24,000 | 66.7 | 62 | 129 | 276 |
| Judson-Wabash | 14,000 | 64.3 | 45 | 90 | 191 |
| Wabash-Crafton | 10,000 | 62.8 | R/W | 71 | 154 |

a. A.D.T. means current average daily two-way traffic volume.
b. CNEL values are given at 100 feet from all roadway centerlines (see the Appendix for assumptions).
c. All distances are measured from the centerline. R/W means the contour falls within the right-of-way.

Table 2-1 (Continued)
General Plan Buildout Exterior Noise Exposure
Adjacent to City Roadways

| Roadway | A.D.T.[a] (Veh/Day) | CNEL[b] @ 100 Feet | Distance to Contours (Ft.)[c] 70 dBA | 65 dBA | 60 dBA |
|---|---|---|---|---|---|
| **Cypress Ave.** | | | | | |
| Terracina-Citrus | 12,000 | 63.6 | R/W | 81 | 172 |
| **California St.** | | | | | |
| Palmetto-Lugonia | 40,000 | 68.6 | 84 | 165 | 348 |
| Lugonia-Redlands | 58,000 | 70.2 | 103 | 209 | 444 |
| Redlands-Barton | 23,000 | 66.2 | R/W | 118 | 243 |
| **Nevada** | | | | | |
| San Bernardino-Lugonia | 22,000 | 65.6 | 53 | 109 | 233 |
| Lugonia-Redlands | 26,000 | 66.3 | 59 | 121 | 259 |
| Redlands-Barton | 18,000 | 64.7 | 47 | 96 | 203 |
| **Alabama St./Palm** | | | | | |
| North of S. Bernardino | 38,000 | 69.0 | 88 | 175 | 370 |
| S.Bernardino-I–10 Fwy | 58,000 | 70.9 | 113 | 232 | 494 |
| I–10 Fwy-Redlands | 47,000 | 70.0 | 100 | 203 | 431 |
| Redlands-Barton | 37,000 | 68.9 | 87 | 173 | 365 |
| **Tennessee/San Mateo** | | | | | |
| Lugonia-Brookside | 29,000 | 67.5 | 69 | 146 | 312 |
| Brookside-Highland | 20,000 | 65.9 | 55 | 114 | 244 |
| **Texas/Center** | | | | | |
| Pioneer-Colton | 28,000 | 66.6 | 61 | 127 | 272 |
| Colton-Brookside | 18,000 | 65.4 | 52 | 106 | 226 |
| Brookside-Highland | 13,000 | 63.9 | R/W | 85 | 182 |
| **Eureka St.** | | | | | |
| Pearl-Citrus | 10,000 | 62.2 | R/W | 66 | 139 |
| **Orange St./Cajon** | | | | | |
| North of Pioneer | 22,000 | 66.3 | 59 | 121 | 259 |
| Pioneer-Lugonia | 21,000 | 66.1 | 57 | 118 | 252 |
| Lugonia-I–10 Fwy | 27,000 | 66.5 | 60 | 125 | 267 |
| I–10 Fwy-Citrus | 21,000 | 65.4 | 52 | 106 | 226 |
| Citrus-Highland | 14,000 | 63.5 | R/W | 80 | 171 |
| Highland-Elizabeth | 9,000 | 61.6 | R/W | 60 | 128 |
| **Judson St./Ford St.** | | | | | |
| Pioneer-Colton | 8,000 | 61.1 | R/W | 55 | 118 |
| Colton-I–10 Fwy. | 10,000 | 62.8 | R/W | 71 | 154 |
| **Wabash Ave.** | | | | | |
| Pioneer-Lugonia | 7,000 | 60.5 | R/W | 50 | 108 |
| Lugonia-Citrus | 9,000 | 61.6 | R/W | 60 | 128 |
| Citrus-I–10 Fwy. | 13,000 | 63.2 | 36 | 76 | 163 |
| **Crafton** | | | | | |
| San Bernardino-5th | 9,000 | 61.6 | R/W | 60 | 128 |
| **Sand Canyon** | | | | | |
| East of Crafton | 12,000 | 63.0 | R/W | 75 | 157 |
| **San Timoteo Cyn. Road** | | | | | |
| Brookside-Allesandro | 18,000 | 65.3 | 49 | 105 | 225 |
| Allesandro-Live Oaks | 20,000 | 65.8 | 53 | 113 | 243 |

a. A.D.T. means current average daily two-way traffic volume.
b. CNEL values are given at 100 feet from all roadway centerlines (see the Appendix for assumptions).
c. All distances are measured from the centerline. R/W means the contour falls within the right-of-way.

Table 2-2
Increase in Motor Vehicle Noise

| Roadway | CNEL at 100 Feet[a] 1994 | G.P. Buildout | Increase (dBA) |
|---|---|---|---|
| **Interstate 10** | | | |
| Mtn View-California | 79.4 | 82.6 | 3.2 |
| California-Alabama | 79.4 | 82.5 | 3.1 |
| Alabama-SR 30 | 79.4 | 81.9 | 2.5 |
| SR 30-Orange | 78.7 | 80.8 | 2.1 |
| Orange-University | 77.6 | 81.1 | 3.5 |
| University-Cypress | 76.8 | 80.8 | 4.0 |
| Cypress-Ford | 76.9 | 80.9 | 4.0 |
| Ford-Redlands | 76.5 | 81.2 | 4.7 |
| Redlands-Wabash | 76.8 | 80.6 | 3.8 |
| Wabash-Yucaipa | 77.1 | 80.7 | 3.6 |
| **State Route 30** | | | |
| I–10-San Bernardino | 73.2 | 75.9 | 2.7 |
| **Palmetto** | | | |
| California-Alabama | 52.1 | 65.0 | 12.9 |
| **San Bernardino Ave.** | | | |
| Mtn View-Alabama | 58.1 | 67.7 | 9.6 |
| Alabama-Orange | 61.8 | 70.3 | 8.5 |
| Orange-Church | 62.5 | 66.2 | 3.7 |
| Church-Wabash | 56.8 | 66.0 | 9.2 |
| Wabash-Mill Creek | 55.1 | 63.0 | 7.9 |
| **Lugonia Ave./Mentone Blvd.** | | | |
| Mtn View-Alabama | 56.8 | 67.0 | 10.2 |
| Alabama-Orange | 60.5 | 67.8 | 7.3 |
| Orange-Wabash | 63.0 | 65.6 | 2.6 |
| Wabash-Garnet | 61.2 | 65.0 | 3.8 |
| **Redlands Blvd.** | | | |
| California-Alabama | 66.0 | 69.2 | 3.2 |
| Alabama-Colton | 66.2 | 70.5 | 4.3 |
| Colton-Texas | 65.7 | 68.4 | 2.7 |
| Texas-Citrus | 67.3 | 67.7 | 0.4 |
| Citrus-Highland | 65.0 | 68.0 | 3.0 |
| Highland-I–10 Fwy | 62.0 | 66.4 | 4.4 |
| **Colton Ave.** | | | |
| Sixth-University | 62.1 | 62.9 | 0.8 |
| University-Dearborn | 61.1 | 62.5 | 1.4 |
| Dearborn-Crafton | 59.8 | 61.6 | 1.8 |
| **Barton/Brookside/Citrus** | | | |
| California-Terracina | 65.0 | 68.4 | 3.4 |
| Terracina-Orange | 63.7 | 66.6 | 2.9 |
| Orange-Judson | 64.0 | 66.7 | 2.7 |
| Judson-Wabash | 64.9 | 64.3 | -0.6 |
| Wabash-Crafton | 58.8 | 62.8 | 4.0 |
| **Cypress Ave.** | | | |
| Terracina-Citrus | 62.4 | 63.6 | 1.2 |

a. All distances are measured from the centerline.

## Table 2-2 (Cont.)
## Increase in Motor Vehicle Noise

| Roadway | CNEL at 100 Feet[a] 1994 | G.P. Buildout | Increase (dBA) |
|---|---|---|---|
| **California St.** | | | |
| Palmetto-Lugonia | 52.1 | 68.6 | 16.5 |
| Lugonia-Redlands | 58.1 | 70.2 | 12.1 |
| Redlands-Barton | 60.5 | 66.2 | 5.7 |
| **Nevada** | | | |
| San Bernardino-Lugonia | 52.1 | 65.6 | 13.5 |
| Lugonia-Redlands | 58.1 | 66.3 | 8.2 |
| Redlands-Barton | 52.1 | 64.7 | 12.6 |
| **Alabama St./Palm** | | | |
| North of S. Bernardino | 63.4 | 69.0 | 5.6 |
| S.Bernardino-I–10 Fwy | 64.7 | 70.9 | 6.2 |
| I–10 Fwy-Redlands | 67.3 | 70.0 | 2.7 |
| Redlands-Barton | 66.2 | 68.9 | 2.7 |
| **Tennessee/San Mateo** | | | |
| Lugonia-Brookside | 64.3 | 67.5 | 3.2 |
| Brookside-Highland | 62.4 | 65.9 | 3.5 |
| **Texas/Center** | | | |
| Pioneer-Colton | 58.1 | 66.6 | 8.5 |
| Colton-Brookside | 63.3 | 65.4 | 2.1 |
| **Eureka St.** | | | |
| Pearl-Citrus | 58.1 | 62.2 | 4.1 |
| **Orange St./Cajon** | | | |
| North of Pioneer | 58.8 | 66.3 | 7.5 |
| Pioneer-Lugonia | 61.2 | 66.1 | 4.9 |
| Lugonia-I–10 Fwy | 64.5 | 66.5 | 2.0 |
| I–10 Fwy-Citrus | 65.6 | 65.4 | -0.2 |
| Citrus-Highland | 62.9 | 63.5 | 0.6 |
| **Judson St./Ford St.** | | | |
| Pioneer-Colton | 55.1 | 61.1 | 6.0 |
| Colton-I–10 Fwy. | 59.7 | 62.8 | 3.1 |
| **Wabash Ave.** | | | |
| Pioneer-Lugonia | 55.1 | 60.5 | 5.4 |
| Lugonia-Citrus | 59.8 | 61.6 | 1.8 |
| Citrus-I–10 Fwy. | 55.1 | 63.2 | 8.1 |
| **Crafton** | | | |
| San Bernardino-5th | 59.8 | 61.6 | 1.8 |
| **Sand Canyon** | | | |
| East of Crafton | 60.6 | 63.0 | 2.4 |
| **San Timoteo Cyn. Road** | | | |
| Brookside-Allesandro | 57.5 | 65.3 | 7.8 |

a. All distances are measured from the centerline.

## 2.3 Typical and Design Noise Levels

Noise levels adjacent to roadways vary with the volume of traffic, the mean vehicular speed, the truck mix, and the road cross-section. Figures 2-1 and 2-2 provide nomograph for a typical master planned roadway by type that allows the CNEL at the right-of-way to be determined from the daily two-way traffic volume and the speed of the vehicles.

For example, a 6-lane major arterial roadway carrying 20,000 ADT with a posted speed limit of 50 mph would generate approximately 70.3 CNEL at the right-of-way. Lowering the speed to 45 mph would reduce the CNEL at the right-of-way to 69.1 dBA. Similarly, at a speed of 40 mph, the CNEL at the right-of-way would be 67.8 dBA.

Figure 2-3 illustrates the effect of the truck mix on adjacent noise levels. As shown therein, a 4-lane major arterial street carrying 20,000 ADT at 45 mph would generate 70.2 CNEL at the right-of-way if the truck mix were 2.58 percent of the ADT. The CNEL would increase to 72.0 dBA at the right-of-way if the truck mix were 10 percent of the ADT. A 5 percent truck mix would result in 70.9 CNEL at the right-of-way.

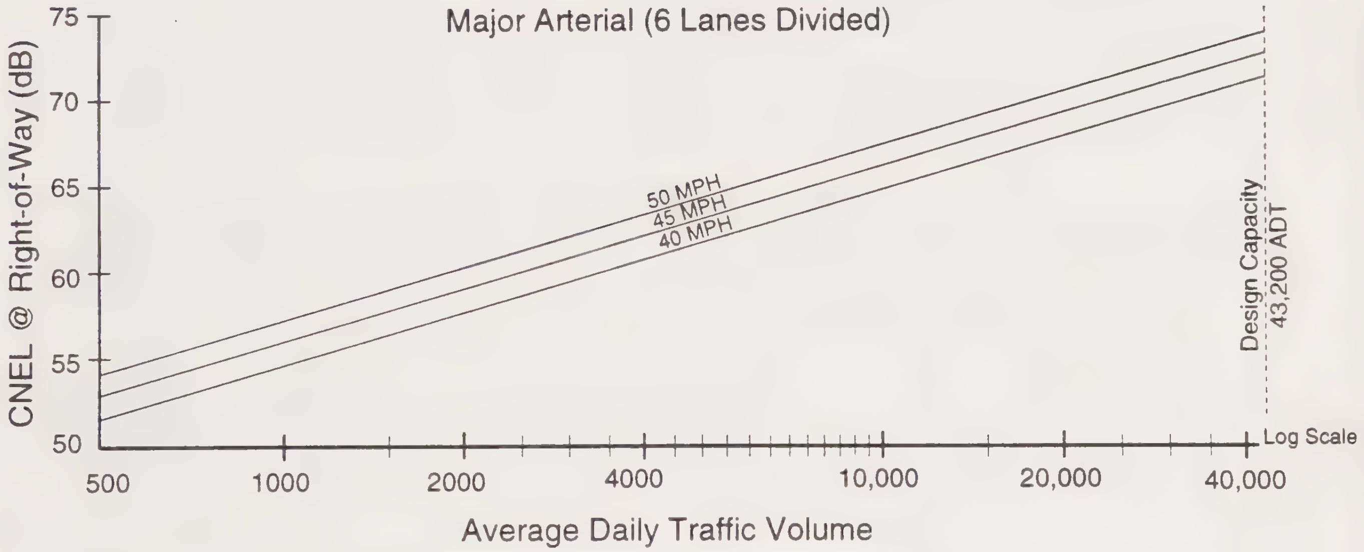
It is recommended that ultimate noise contours at the design capacity of each facility be used for planning purposes and refined when detailed site-specific acoustic reports are prepared for new developments. Until that time, Figure 2-4 can serve as a general planning guide to determine the potential "worst case" future noise levels and the setbacks required to insure an acceptable noise environment for planned land uses.

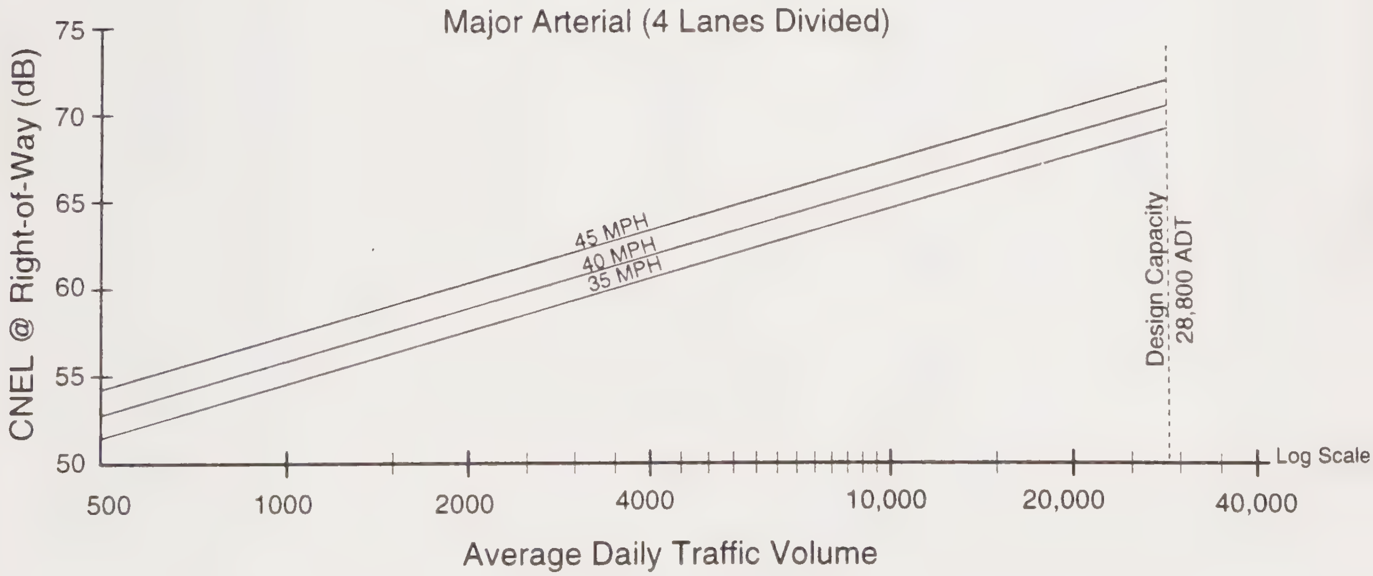
Figure 2-4 provides design noise levels adjacent to typical major, primary and secondary arterials. The nomograph assumes the ultimate daily design capacity for each roadway type as well as typical design speeds and a 2.58 percent truck mix. Figure 2-4 can be used to determine typical CNEL contours between 50 and 300 feet from the roadway centerlines, assuming flat terrain and no intervening barriers or buildings.

## Figure 2-1

### Typical Noise Levels Versus Speed and Volume

Major Arterials



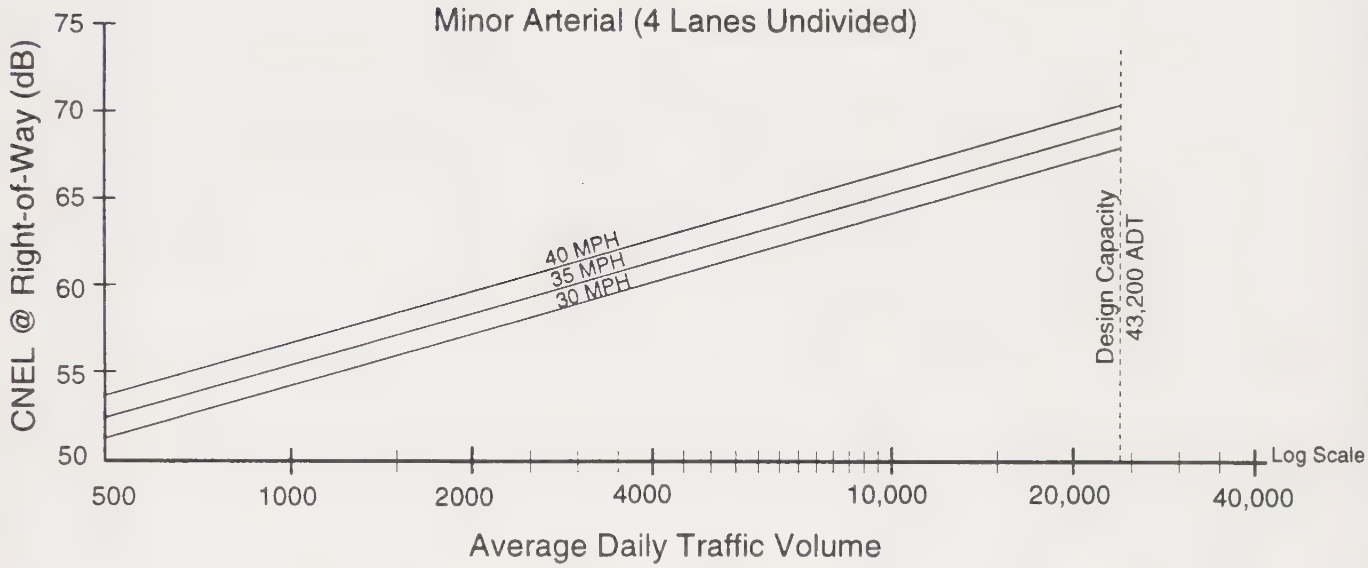



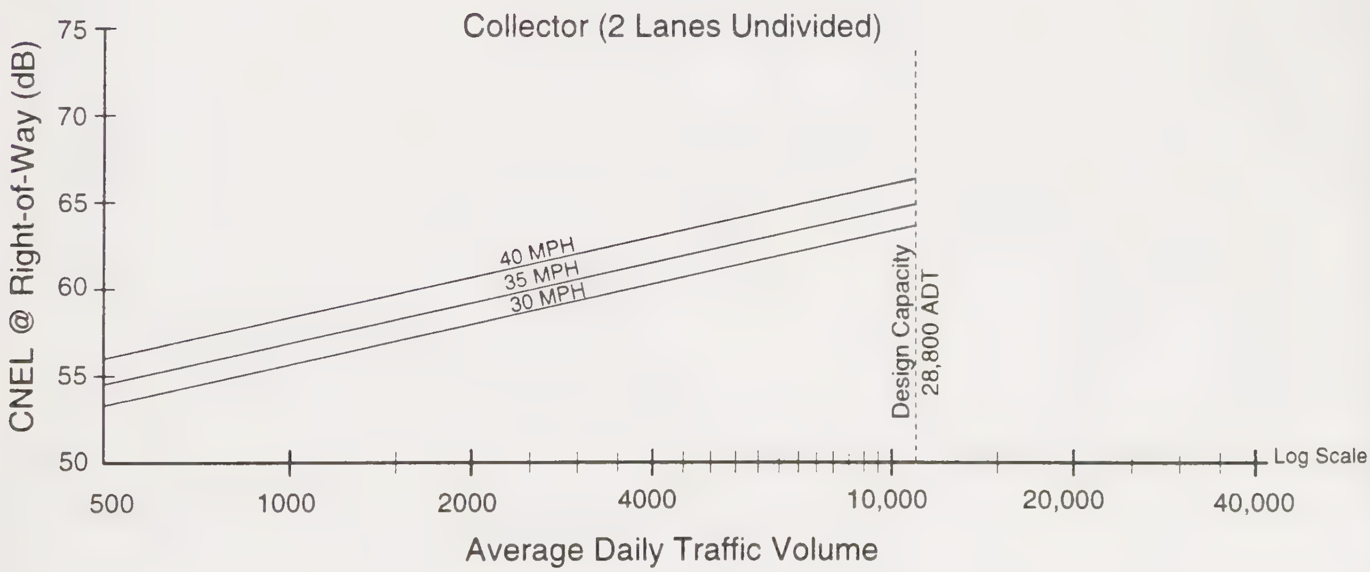

Endo Engineering

## Figure 2-2

### Typical Noise Levels Versus Speed and Volume

Minor Arterials & Collectors

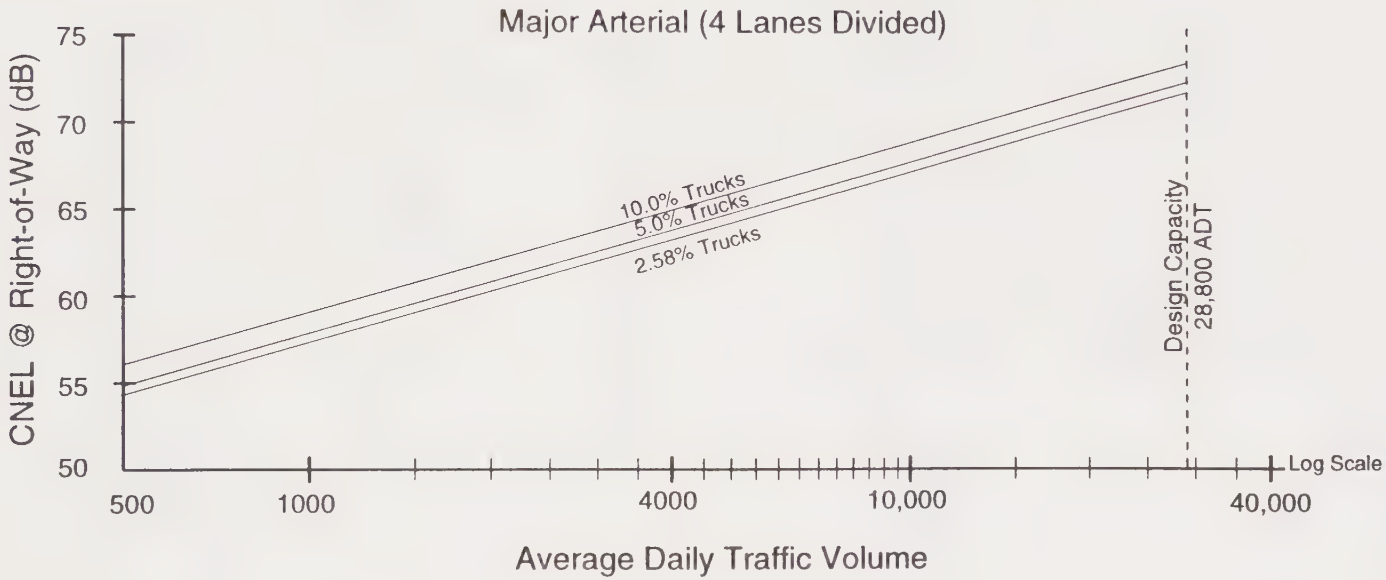



*Endo Engineering*

## Figure 2-3

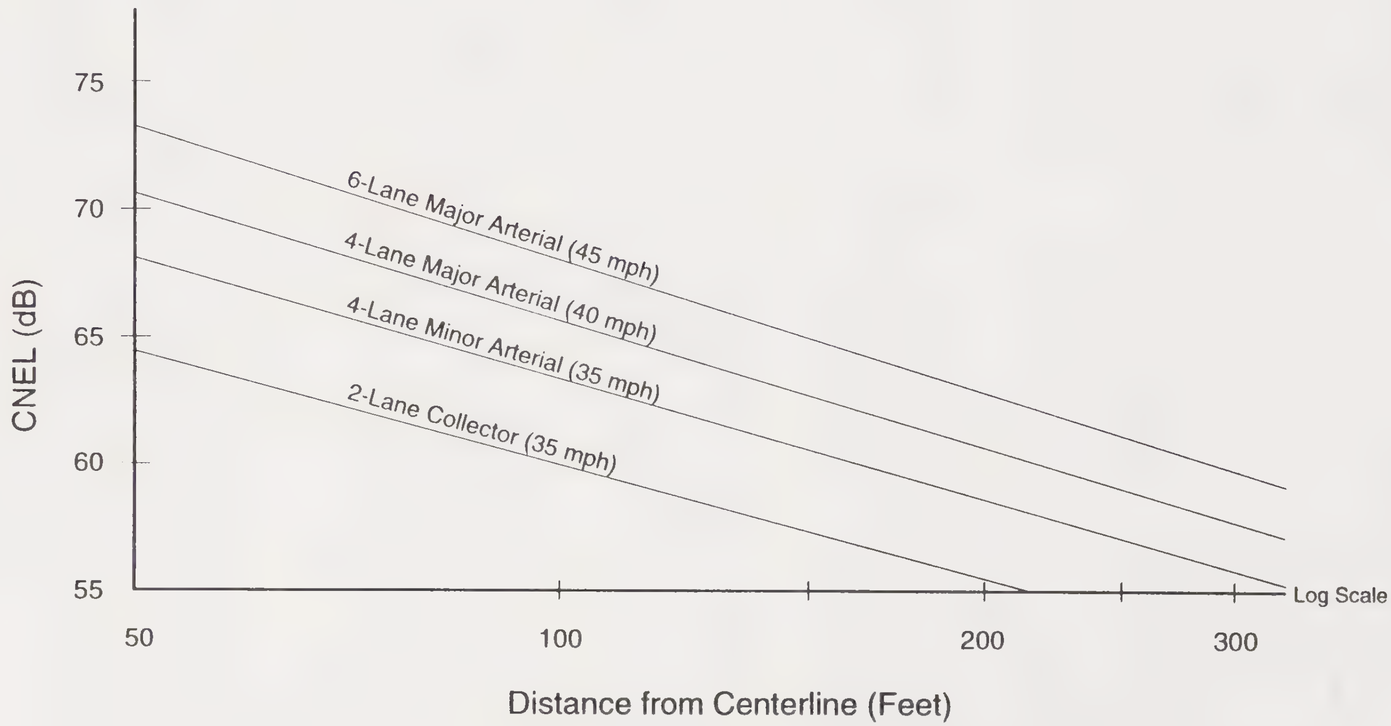
Effects of Truck Mix
on CNEL at 45 mph




Endo Engineering

## Figure 2-4

## Design Noise Levels for the City of Redlands




Endo Engineering

## 3.0 RAILROAD AND AIRCRAFT NOISE

### Railroad Noise

The Southern Pacific Transportation Company has a main railroad line running through the southwest corner of Redlands. This is the main Southern Pacific line serving Los Angeles. Twenty-eight trains per day typically pass along this line through the San Timoteo Canyon. Most of the trains are freight operations that occur during the daytime, however, there are a few evening and nighttime freight operations as well as Amtrak service.

The AT&SF Railroad Company also has a railroad line and other spur lines that pass through the City of Redlands. The line enters and exits the City a number of times. To the City's west, the line crosses the City boundary at Mountain View Avenue (north of I-10), at the intersection of Nevada Street and the southern City boundary, and near the intersection of Alabama Street and Redlands Boulevard. The line crosses the City's eastern boundary near the intersection of Colton Avenue and the City line, and turns north to Mentone. This line has only occasional freight traffic. Noise levels along the AT&SF railroad lines are considered insignificant.

Noise exposure contours along the Southern Pacific Transportation Company main railroad line were determined from the number and type of trains using the line, the magnitude and duration of each train pass, and the time of day when the train passes. Using the procedures developed by Wyle Laboratories, an analysis of the train operations was performed to determine existing noise levels.[1]

At 100 feet from the railway centerline, the noise level was determined to be 72.8 CNEL. The noise level at 200, 400, and 800 feet from the tracks is projected to be 68.8, 63.3, and 57.3 CNEL, respectively. The 65 CNEL contour is approximately 320 feet from the tracks, and the 60 CNEL contour is approximately 600 feet from the tracks. No measurements of railroad noise were made.

Contours for long-term conditions require projections of future rail use, speed, time of use, quality of track, etc. Since the Southern Pacific Transportation Company has no projections for future operations, it is not possible at this time to accurately predict future conditions. Proposed developments near the main railroad line should be required to address noise impacts from the railroad on the proposed project.

### Aircraft Noise

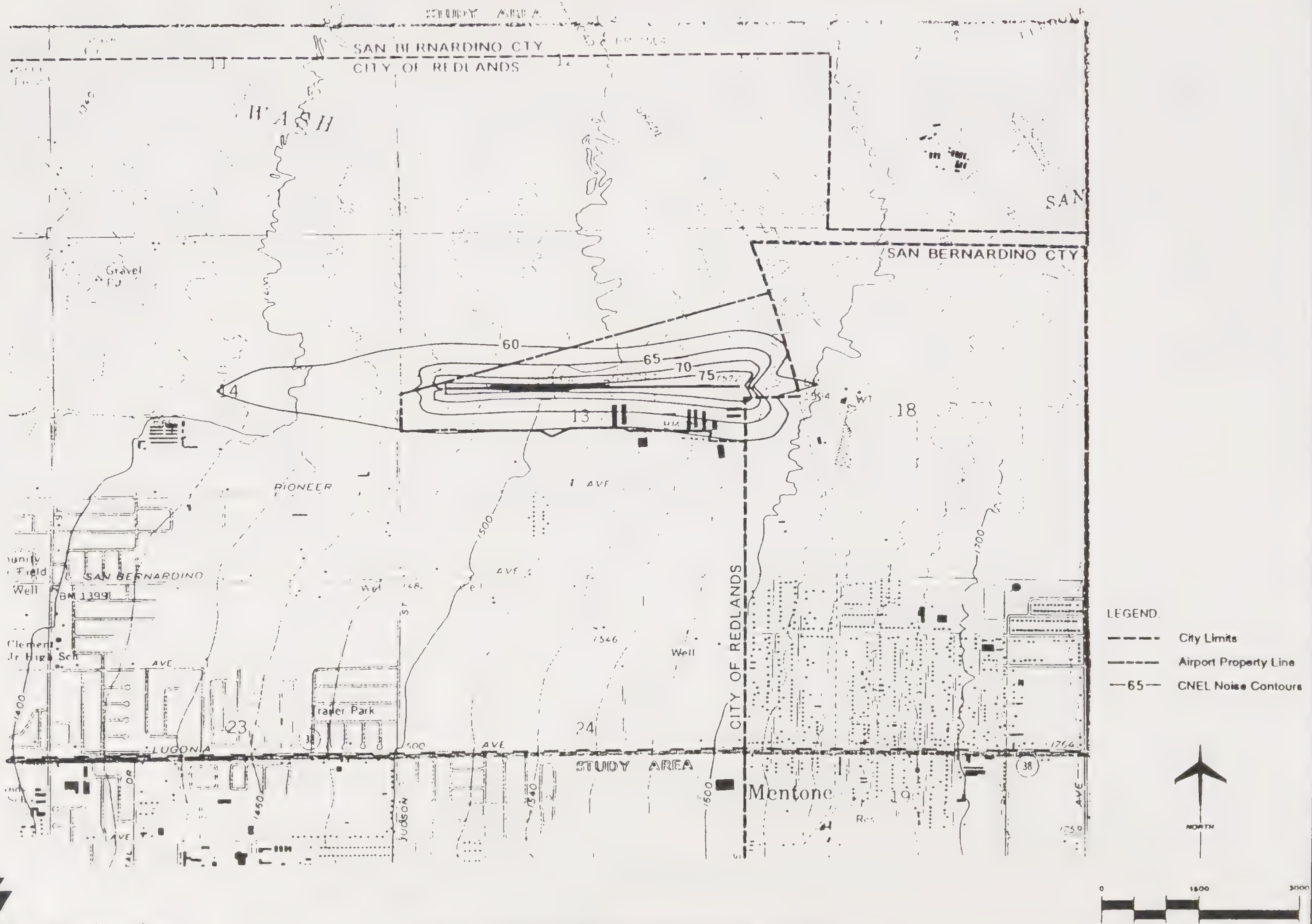
The Redlands Municipal Airport is a city-owned general aviation facility and is located north of Pioneer Avenue, between Judson Street to the west and Wabash Avenue to the east. The 1993 Redlands Municipal Airport Master Plan projects an increase from 65,100 operations in 1991 to 102,000 operations in 2015. The adopted November 1993 Redlands Municipal Airport Master Plan includes existing noise contours from the airport as shown in Figure 3-1. Year 2015 noise contours are shown in Figure 3-2.

---

Wyle Laboratories, "Assessment of Noise Environments Around Railroad Operations"; July 1973.

## Figure 3-1

## Redlands Municipal Airport 1992 Noise Contours

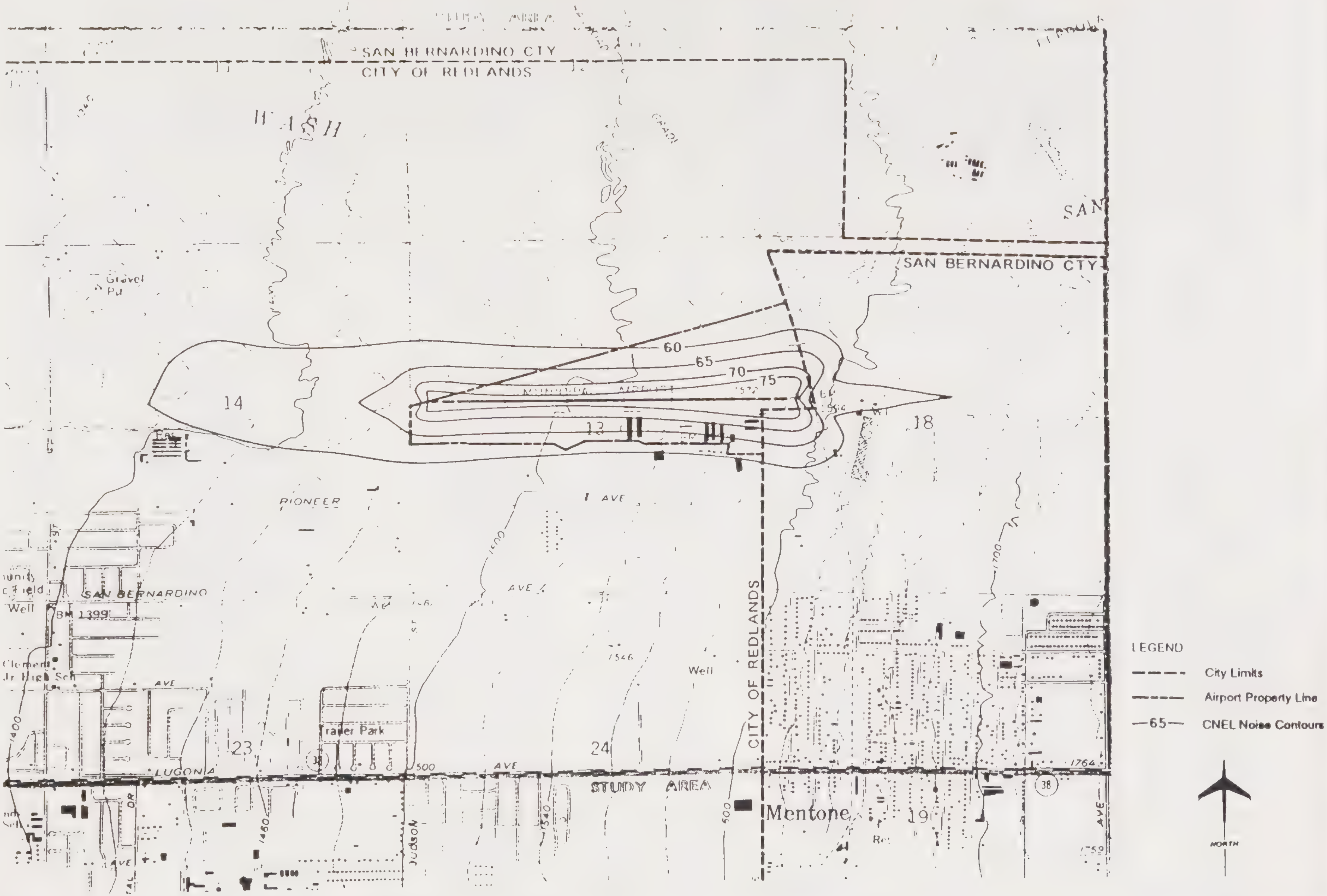



*Endo Engineering*

Source: Redlands Municipal Airport Master Plan, 1994.

Figure 3-2

Redlands Municipal Airport 2015 Noise Contours




Endo Engineering

Source: Redlands Municipal Airport Master Plan, 1994.

## *4.0 FINDINGS AND CONCLUSIONS*

The following findings and conclusions summarize the major technical findings of this analysis of environmental noise in the City of Redlands.

1. Ambient noise levels in the project area are affected primarily by motor vehicle noise emanating from the freeways, area roadways, and the Southern Pacific railroad.

2. The current noise exposure resulting from motor vehicles on area roadways ranges from a low of 53.1 CNEL along Palmetto to a high of 79.4 CNEL along Interstate 10.

3. The 70 CNEL noise contour presently falls within the right-of-way along eighty-one percent of the surface street links analyzed.

4. The noise level at 100 feet from the Interstate 10 centerline currently ranges from 76.5 to 79.4 CNEL.

5. The current noise level at 100, 200, 400, and 800 feet from the railroad tracks is projected to be 72.8, 68.8, 63.3, and 57.3 CNEL, respectively.

6. Introduction of the San Bernardino International Airport (at the old Norton Air Force Base) will result in higher noise levels in the City of Redlands, even with the anticipated use of quieter aircraft. Plans for the future development of this airport have not been established; therefore, noise contours are not available at this time.

## *Noise Appendix*

Redlands Land Use Compatibility Standards
RD-77-108 Noise Assumptions
Train Noise Worksheet

## *City of Redlands*

Noise/Land Use Compatibility Matrix
Interior and Exterior Noise Standards

Source: City of Redlands Noise Element

TABLE 9-A
NOISE/LAND USE COMPATIBILITY MATRIX

| Land Use Categories | | Community Noise Equivalent Level CNEL | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Categories** | **Uses** | ≤55 | 60 | 65 | 70 | 75 | 80≥ | |
| RESIDENTIAL | Single Family, Duplex Multiple Family | A | B | C | C | D | D | D |
| RESIDENTIAL | Mobile Homes | A | A | B | C | C | D | D |
| COMMERCIAL Regional, District | Hotel, Motel, Transient Lodging | A | A | B | B | C | C | D |
| COMMERCIAL Regional, Village District, Special | Commercial Retail, Bank, Restaurant, Movie Theater | A | A | A | A | B | B | C |
| COMMERCIAL INDUSTRIAL INSTITUTIONAL | Office Building, Research & Dev., Professional Offices, City Office Building | A | A | A | B | B | C | D |
| COMMERCIAL Recreation INSTITUTIONAL Civic Center | Amphitheater, Concert Hall, Auditorium, Meeting Hall | B | B | C | C | D | D | D |
| COMMERCIAL Recreation | Childrens Amusement Park, Miniature Golf Course, Go-cart Track, Equestrian Center, Sports Club | A | A | A | A | B | B | B |
| COMMERCIAL General, Special INDUSTRIAL, INSTITUTIONAL | Automobile Service Station, Auto Dealership, Manufacturing, Warehousing, Wholesale, Utilities | A | A | A | A | B | B | B |
| INSTITUTIONAL General | Hospital, Church, Library, Schools Classroom | A | A | B | C | C | D | D |
| OPEN SPACE | Parks | A | A | A | B | C | D | D |
| OPEN SPACE | Golf Course, Cemeteries, Nature Centers, Wildlife Reserves, Wildlife Habitat | A | A | A | A | B | C | C |
| AGRICULTURE | Agriculture | A | A | A | A | A | A | A |

*Continued on next page*

**TABLE 9-A**
**INTERPRETATION**

| | |
|---|---|
| ZONE A<br>CLEARLY COMPATIBLE | Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements. |
| ZONE B<br>NORMALLY COMPATIBLE | New construction or development should be undertaken only after detailed analysis of the noise reduction requirements are made and needed noise insulation features in the design are determined. Conventional construction, with closed windows and fresh air supply systems or air conditioning, will normally suffice. |
| ZONE C<br>NORMALLY INCOMPATIBLE | New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of noise reduction requirements must be made and needed noise insulation features included in the design. |
| ZONE D<br>CLEARLY INCOMPATIBLE | New construction or development should generally not be undertaken. |

Source: Mestre Greve Associates; Guidelines for the Preparation and Content of the Noise Element of the General Plan, prepared by the California Department of Health Services in coordination with The Governor's Office of Planning and Research. Adapted to the City of Redlands' standards.

**TABLE 9-B**
**INTERIOR AND EXTERIOR NOISE STANDARDS**

| LAND USE CATEGORIES | | ENERGY AVERAGE CNEL | |
|---|---|---|---|
| Categories | Uses | Interior[1] | Exterior[2] |
| RESIDENTIAL | Single Family, Duplex, Multiple Family | 40[3] 50[4] | 60 |
| | Mobile Home | --- | 60[5] |
| COMMERCIAL INDUSTRIAL INSTITUTIONAL | Hotel, Motel, Transient Lodging | 40 | 60[6] |
| | Commercial Retail, Bank Restaurant | 55 | --- |
| | Office Building, Research & Development, Professional Offices, City Office Building | 50 | --- |
| | Amphitheater, Concert Hall, Auditorium, Meeting Hall | 45 | --- |
| | Gymnasium (Multipurpose) | 50 | --- |
| | Sports Club | 55 | --- |
| | Manufacturing, Warehousing, Wholesale, Utilities | 60 | --- |
| | Movie Theaters | 45 | --- |
| INSTITUTIONAL | Hospital, Schools classrooms | 45 | 60 |
| OPEN SPACE | Parks | --- | 60 |

*Continued on next page*

TABLE 9-B
INTERIOR AND EXTERIOR NOISE STANDARDS
INTERPRETATION

[1]Indoor environment excluding bathrooms, toilets, closets, corridors.

[2]Outdoor environment limited to private yard of single family; multifamily private patio or balcony which is served by a means of exit from inside; mobile home park; hospital patio; park picnic area; school playground; hotel and recreational area.

[3]Noise level requirement with closed windows. Mechanical ventilating system or other means of natural ventilation shall be provided as of Chapter 12, Section 1205 of UBC.

[4]Noise level requirement with open windows, if they are used to meet natural ventilation requirement.

[5]Exterior noise level should be such that interior level will not exceed 45 CNEL.

[6]Except those areas affected by aircraft noise.

See also Policy 9-s.

Source: Mestre Greve Associates.

# RD-77-108 Noise Assumptions

## *I. Temporal Traffic Distribution Assumed (Percent)*

| Type of Vehicle | Day | Evening | Night |
|---|---|---|---|
| Automobile | 75.51 | 12.57 | 9.31 |
| Medium Truck | 1.56 | 0.09 | 0.19 |
| Heavy Truck | 0.64 | 0.02 | 0.08 |

Orange County EMA representing 31 arterial intersections throughout the County and assumed to be typical of southern California arterials.

Designated truck routes within the City were assumed to carry 5% trucks with the same medium/heavy truck percentage and the same temporal distribution by type of vehicle. Truck percentages were provided by Caltrans on the state highways.

***II. Road Grade Assumptions*** -- level terrain and roadway.

***III. Roadway Widths Assumed***-- were based upon the traffic information provided by the traffic consultant.

***IV. Speeds Assumed*** -- for a "worst case" analysis, the noise modeling assumed 55 mph for the freeways and 45 mph for all other roadways.

***V. RD-77-108 Input Parameters*** -- see the tables on the following pages.

## Assumptions for FHWA RD-77-108 Noise Model

| Roadway | Speed[a] (mph) | Half-Width[b] (feet) | Percent Trucks[c] | (% Medium) |
|---|---|---|---|---|
| EXISTING | | | | |
| **Interstate 10** | | | | |
| Mtn View-California | 55 | 57 | 12.30 | 41.10 |
| California-Alabama | 55 | 57 | 12.30 | 41.10 |
| Alabama-SR 30 | 55 | 57 | 12.00 | 40.30 |
| SR 30-Orange | 55 | 57 | 10.40 | 43.10 |
| Orange-University | 55 | 45 | 12.00 | 40.30 |
| University-Cypress | 55 | 45 | 12.00 | 40.30 |
| Cypress-Ford | 55 | 45 | 12.00 | 40.30 |
| Ford-Redlands | 55 | 45 | 12.00 | 40.30 |
| Redlands-Wabash | 55 | 45 | 12.00 | 40.30 |
| Wabash-Yucaipa | 55 | 45 | 13.00 | 37.10 |
| **State Route 30** | | | | |
| I–10-San Bernardino | 55 | 33 | 9.90 | 44.70 |
| North of San Bernardino | 55 | 33 | 5.00 | 44.70 |
| **Palmetto** | | | | |
| California-Alabama | 45 | 6 | 2.58 | 71.32 |
| **San Bernardino Ave.** | | | | |
| Mtn View-Alabama | 45 | 6 | 2.58 | 71.32 |
| Alabama-Orange | 45 | 6 | 5.00 | 71.32 |
| Orange-Church | 45 | 6 | 2.58 | 71.32 |
| Church-Wabash | 45 | 6 | 2.58 | 71.32 |
| Wabash-Mill Creek | 45 | 6 | 2.58 | 71.32 |
| **Lugonia Ave./Mentone Blvd.** | | | | |
| Mtn View-Alabama | 45 | 6 | 2.58 | 71.32 |
| Alabama-Orange | 45 | 6 | 2.58 | 71.32 |
| Orange-Wabash | 45 | 18 | 2.58 | 71.32 |
| Wabash-Garnet | 45 | 18 | 2.58 | 71.32 |
| **Redlands Blvd.** | | | | |
| California-Alabama | 45 | 25 | 5.00 | 71.32 |
| Alabama-Colton | 45 | 25 | 5.00 | 71.32 |
| Colton-Texas | 45 | 25 | 5.00 | 71.32 |
| Texas-Citrus | 45 | 25 | 5.00 | 71.32 |
| Citrus-Highland | 45 | 25 | 5.00 | 71.32 |
| Highland-I–10 Fwy | 45 | 25 | 5.00 | 71.32 |
| **Colton Ave.** | | | | |
| Redlands-Sixth | 45 | 6 | 5.00 | 71.32 |
| Sixth-University | 45 | 6 | 2.58 | 71.32 |
| University-Dearborn | 45 | 6 | 2.58 | 71.32 |
| Dearborn-Crafton | 45 | 6 | 2.58 | 71.32 |
| **Barton/Brookside/Citrus** | | | | |
| California-Terracina | 45 | 25 | 5.00 | 71.32 |
| Terracina-Orange | 45 | 25 | 2.58 | 71.32 |
| Orange-Judson | 45 | 18 | 5.00 | 71.32 |
| Judson-Wabash | 45 | 18 | 5.00 | 71.32 |
| Wabash-Crafton | 45 | 6 | 5.00 | 71.32 |

a. Speed was assumed to be 55 mph for freeways and 45 mph for all other roadways.
b. The half-width is the distance from the roadway centerline to the center of the outermost travel lane.
c. Truck mix for freeway provided by Caltrans, truck mix for truck routes were assumed to be 5%, and truck mix for local streets are based upon the OCEMA study.

## Assumptions for FHWA RD-77-108 Noise Model (Cont.)

| Roadway | Speed[a] (mph) | Half-Width[b] (feet) | Percent Trucks[c] | (% Medium) |
|---|---|---|---|---|
| **Cypress Ave.** | | | | |
| Terracina-Citrus | 45 | 18 | 5.00 | 71.32 |
| **California St.** | | | | |
| Palmetto-Lugonia | 45 | 6 | 2.58 | 71.32 |
| Lugonia-Redlands | 45 | 6 | 2.58 | 71.32 |
| Redlands-Barton | 45 | 6 | 2.58 | 71.32 |
| **Nevada** | | | | |
| San Bernardino-Lugonia | 45 | 6 | 2.58 | 71.32 |
| Lugonia-Redlands | 45 | 6 | 2.58 | 71.32 |
| Redlands-Barton | 45 | 6 | 2.58 | 71.32 |
| **Alabama St./Palm** | | | | |
| North of S. Bernardino | 45 | 25 | 5.00 | 71.32 |
| S.Bernardino-I–10 Fwy | 45 | 25 | 5.00 | 71.32 |
| I–10 Fwy-Redlands | 45 | 25 | 5.00 | 71.32 |
| Redlands-Barton | 45 | 25 | 5.00 | 71.32 |
| **Tennessee/San Mateo** | | | | |
| Lugonia-Brookside | 45 | 18 | 5.00 | 71.32 |
| Brookside-Highland | 45 | 18 | 5.00 | 71.32 |
| **Texas/Center** | | | | |
| Pioneer-Colton | 45 | 6 | 2.58 | 71.32 |
| Colton-Brookside | 45 | 18 | 5.00 | 71.32 |
| Brookside-Highland | 45 | 6 | 5.00 | 71.32 |
| **Eureka St.** | | | | |
| Pearl-Citrus | 45 | 6 | 2.58 | 71.32 |
| **Orange St./Cajon** | | | | |
| North of Pioneer | 45 | 6 | 5.00 | 71.32 |
| Pioneer-Lugonia | 45 | 6 | 5.00 | 71.32 |
| Lugonia-I–10 Fwy | 45 | 18 | 2.58 | 71.32 |
| I–10 Fwy-Citrus | 45 | 18 | 2.58 | 71.32 |
| Citrus-Highland | 45 | 6 | 2.58 | 71.32 |
| Highland-Elizabeth | 45 | 6 | 2.58 | 71.32 |
| **Judson St./Ford St.** | | | | |
| Pioneer-Colton | 45 | 6 | 2.58 | 71.32 |
| Colton-I–10 Fwy. | 45 | 6 | 5.00 | 71.32 |
| **Wabash Ave.** | | | | |
| Pioneer-Lugonia | 45 | 6 | 2.58 | 71.32 |
| Lugonia-Citrus | 45 | 6 | 2.58 | 71.32 |
| Citrus-I–10 Fwy. | 45 | 6 | 2.58 | 71.32 |
| **Crafton** | | | | |
| San Bernardino-5th | 45 | 6 | 2.58 | 71.32 |
| **Sand Canyon** | | | | |
| East of Crafton | 45 | 18 | 2.58 | 71.32 |
| **San Timoteo Cyn. Road** | | | | |
| Brookside-Allesandro | 45 | 6 | 5.00 | 71.32 |
| Allesandro-Live Oaks | 45 | 6 | 5.00 | 71.32 |

a. Speed was assumed to be 55 mph for freeways and 45 mph for all other roadways.

b. The half-width is the distance from the roadway centerline to the center of the outermost travel lane.

c. Truck mix for freeway provided by Caltrans, truck mix for truck routes were assumed to be 5%, and truck mix for local streets are based upon the OCEMA study.

## Assumptions for FHWA RD-77-108 Noise Model (Cont.)

| Roadway | Speed[a] (mph) | Half-Width[b] (feet) | Percent Trucks[c] | (% Medium) |
|---|---|---|---|---|
| **Buildout** | | | | |
| **Interstate 10** | | | | |
| Mtn View-California | 55 | 69 | 12.30 | 41.10 |
| California-Alabama | 55 | 69 | 12.30 | 41.10 |
| Alabama-SR 30 | 55 | 69 | 12.00 | 40.30 |
| SR 30-Orange | 55 | 57 | 10.40 | 43.10 |
| Orange-University | 55 | 57 | 12.00 | 40.30 |
| University-Cypress | 55 | 57 | 12.00 | 40.30 |
| Cypress-Ford | 55 | 57 | 12.00 | 40.30 |
| Ford-Redlands | 55 | 57 | 12.00 | 40.30 |
| Redlands-Wabash | 55 | 57 | 12.00 | 40.30 |
| Wabash-Yucaipa | 55 | 57 | 13.00 | 37.10 |
| **State Route 30** | | | | |
| I–10-San Bernardino | 55 | 33 | 9.90 | 44.70 |
| North of San Bernardino | 55 | 33 | 5.00 | 44.70 |
| **Palmetto** | | | | |
| California-Alabama | 45 | 18 | 2.58 | 71.32 |
| **San Bernardino Ave.** | | | | |
| Mtn View-Alabama | 45 | 38 | 2.58 | 71.32 |
| Alabama-Orange | 45 | 38 | 5.00 | 71.32 |
| Orange-Church | 45 | 25 | 2.58 | 71.32 |
| Church-Wabash | 45 | 18 | 2.58 | 71.32 |
| Wabash-Mill Creek | 45 | 18 | 2.58 | 71.32 |
| **Lugonia Ave./Mentone Blvd.** | | | | |
| Mtn View-Alabama | 45 | 25 | 2.58 | 71.32 |
| Alabama-Orange | 45 | 25 | 2.58 | 71.32 |
| Orange-Wabash | 45 | 18 | 2.58 | 71.32 |
| Wabash-Garnet | 45 | 18 | 2.58 | 71.32 |
| **Redlands Blvd.** | | | | |
| California-Alabama | 45 | 38 | 5.00 | 71.32 |
| Alabama-Colton | 45 | 38 | 5.00 | 71.32 |
| Colton-Texas | 45 | 38 | 5.00 | 71.32 |
| Texas-Citrus | 45 | 25 | 5.00 | 71.32 |
| Citrus-Highland | 45 | 25 | 5.00 | 71.32 |
| Highland-I–10 Fwy | 45 | 25 | 5.00 | 71.32 |
| **Colton Ave.** | | | | |
| Redlands-Sixth | 45 | 18 | 5.00 | 71.32 |
| Sixth-University | 45 | 6 | 2.58 | 71.32 |
| University-Dearborn | 45 | 6 | 2.58 | 71.32 |
| Dearborn-Crafton | 45 | 6 | 2.58 | 71.32 |
| **Barton/Brookside/Citrus** | | | | |
| California-Terracina | 45 | 38 | 5.00 | 71.32 |
| Terracina-Orange | 45 | 25 | 2.58 | 71.32 |
| Orange-Judson | 45 | 18 | 5.00 | 71.32 |
| Judson-Wabash | 45 | 18 | 5.00 | 71.32 |
| Wabash-Crafton | 45 | 6 | 5.00 | 71.32 |

a. Speed was assumed to be 55 mph for freeways and 45 mph for all other roadways.

b. The half-width is the distance from the roadway centerline to the center of the outermost travel lane.

c. Truck mix for freeway provided by Caltrans, truck mix for truck routes were assumed to be 5%, and truck mix for local streets are based upon the OCEMA study.

## Assumptions for FHWA RD-77-108 Noise Model (Cont.)

| Roadway | Speed[a] (mph) | Half-Width[b] (feet) | Percent Trucks[c] | (% Medium) |
|---|---|---|---|---|
| **Cypress Ave.** | | | | |
| Terracina-Citrus | 45 | 18 | 5.00 | 71.32 |
| **California St.** | | | | |
| Palmetto-Lugonia | 45 | 38 | 2.58 | 71.32 |
| Lugonia-Redlands | 45 | 38 | 2.58 | 71.32 |
| Redlands-Barton | 45 | 38 | 2.58 | 71.32 |
| **Nevada** | | | | |
| San Bernardino-Lugonia | 45 | 18 | 2.58 | 71.32 |
| Lugonia-Redlands | 45 | 18 | 2.58 | 71.32 |
| Redlands-Barton | 45 | 18 | 2.58 | 71.32 |
| **Alabama St./Palm** | | | | |
| North of S. Bernardino | 45 | 38 | 5.00 | 71.32 |
| S.Bernardino-I–10 Fwy | 45 | 38 | 5.00 | 71.32 |
| I–10 Fwy-Redlands | 45 | 38 | 5.00 | 71.32 |
| Redlands-Barton | 45 | 38 | 5.00 | 71.32 |
| **Tennessee/San Mateo** | | | | |
| Lugonia-Brookside | 45 | 18 | 5.00 | 71.32 |
| Brookside-Highland | 45 | 18 | 5.00 | 71.32 |
| **Texas/Center** | | | | |
| Pioneer-Colton | 45 | 18 | 2.58 | 71.32 |
| Colton-Brookside | 45 | 18 | 5.00 | 71.32 |
| Brookside-Highland | 45 | 6 | 5.00 | 71.32 |
| **Eureka St.** | | | | |
| Pearl-Citrus | 45 | 18 | 2.58 | 71.32 |
| **Orange St./Cajon** | | | | |
| North of Pioneer | 45 | 18 | 5.00 | 71.32 |
| Pioneer-Lugonia | 45 | 18 | 5.00 | 71.32 |
| Lugonia-I–10 Fwy | 45 | 18 | 2.58 | 71.32 |
| I–10 Fwy-Citrus | 45 | 18 | 2.58 | 71.32 |
| Citrus-Highland | 45 | 6 | 2.58 | 71.32 |
| Highland-Elizabeth | 45 | 6 | 2.58 | 71.32 |
| **Judson St./Ford St.** | | | | |
| Pioneer-Colton | 45 | 6 | 2.58 | 71.32 |
| Colton-I–10 Fwy. | 45 | 6 | 5.00 | 71.32 |
| **Wabash Ave.** | | | | |
| Pioneer-Lugonia | 45 | 6 | 2.58 | 71.32 |
| Lugonia-Citrus | 45 | 6 | 2.58 | 71.32 |
| Citrus-I–10 Fwy. | 45 | 6 | 2.58 | 71.32 |
| **Crafton** | | | | |
| San Bernardino-5th | 45 | 6 | 2.58 | 71.32 |
| **Sand Canyon** | | | | |
| East of Crafton | 45 | 18 | 2.58 | 71.32 |
| **San Timoteo Cyn. Road** | | | | |
| Brookside-Allesandro | 45 | 6 | 5.00 | 71.32 |
| Allesandro-Live Oaks | 45 | 6 | 5.00 | 71.32 |

a. Speed was assumed to be 55 mph for freeways and 45 mph for all other roadways.

b. The half-width is the distance from the roadway centerline to the center of the outermost travel lane.

c. Truck mix for freeway provided by Caltrans, truck mix for truck routes were assumed to be 5%, and truck mix for local streets are based upon the OCEMA study.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Design Noise Levels** | | | | | | | | | | | **Design Noise Levels** | | | | | | |
| Major Arterial 6-D | 20,000 | 67.8 | 76 | 147 | 309 | 76 | 147 | 309 | 100 | 69 | Major Arterial 6-D | 55 | 38 | 2.58 | 71.32 | 0.5 | 49 |
| Major Arterial 6-D | 1,000 | 54.8 | R/W | R/W | 56 | 39 | 43 | 56 | 100 | 52 | Major Arterial 6-D | 55 | 38 | 2.58 | 71.32 | 0.5 | 38 |
| Major Arterial 6-D | 20,000 | 65.6 | 60 | 108 | 222 | 60 | 108 | 222 | 100 | 44 | Major Arterial 6-D | 45 | 38 | 2.58 | 71.32 | 0.5 | 44 |
| Major Arterial 6-D | 1,000 | 52.6 | 39 | 40 | 48 | 39 | 40 | 48 | 100 | 30 | Major Arterial 6-D | 45 | 38 | 2.58 | 71.32 | 0.5 | 38 |
| Major Arterial 6-D | 20,000 | 62.9 | 49 | 77 | 149 | 49 | 77 | 149 | 100 | 44 | Major Arterial 6-D | 35 | 38 | 2.58 | 71.32 | 0.5 | 41 |
| Major Arterial 6-D | 1,000 | 49.9 | 38 | 39 | 43 | 38 | 39 | 43 | 100 | 30 | Major Arterial 6-D | 35 | 38 | 2.58 | 71.32 | 0.5 | 38 |
| **Design Noise Levels** | | | | | | | | | | | **Design Noise Levels** | | | | | | |
| Major Arterial 4-D | 20,000 | 67.5 | 71 | 144 | 307 | 71 | 144 | 307 | 100 | 69 | Major Arterial 4-D | 55 | 25 | 2.58 | 71.32 | 0.5 | 40 |
| Major Arterial 4-D | 1,000 | 54.5 | R/W | R/W | R/W | 27 | 32 | 49 | 100 | 52 | Major Arterial 4-D | 55 | 25 | 2.58 | 71.32 | 0.5 | 25 |
| Major Arterial 4-D | 20,000 | 65.3 | 53 | 104 | 220 | 53 | 104 | 220 | 100 | 44 | Major Arterial 4-D | 45 | 25 | 2.58 | 71.32 | 0.5 | 33 |
| Major Arterial 4-D | 1,000 | 52.3 | R/W | R/W | 39 | 26 | 29 | 39 | 100 | 30 | Major Arterial 4-D | 45 | 25 | 2.58 | 71.32 | 0.5 | 25 |
| Major Arterial 4-D | 20,000 | 62.6 | R/W | 71 | 146 | 40 | 71 | 146 | 100 | 44 | Major Arterial 4-D | 35 | 25 | 2.58 | 71.32 | 0.5 | 29 |
| Major Arterial 4-D | 1,000 | 49.6 | R/W | R/W | 32 | 25 | 27 | 32 | 100 | 30 | Major Arterial 4-D | 35 | 25 | 2.58 | 71.32 | 0.5 | 25 |
| **Design Noise Levels** | | | | | | | | | | | **Design Noise Levels** | | | | | | |
| Minor Arterial 4-U | 20,000 | 67.4 | R/W | 143 | 307 | 68 | 143 | 307 | 100 | 69 | Minor Arterial 4-U | 55 | 18 | 2.58 | 71.32 | 0.5 | 36 |
| Minor Arterial 4-U | 1,000 | 54.4 | R/W | R/W | R/W | 20 | 26 | 45 | 100 | 52 | Minor Arterial 4-U | 55 | 18 | 2.58 | 71.32 | 0.5 | 18 |
| Minor Arterial 4-U | 20,000 | 65.2 | 50 | 103 | 219 | 50 | 103 | 219 | 100 | 44 | Minor Arterial 4-U | 45 | 18 | 2.58 | 71.32 | 0.5 | 28 |
| Minor Arterial 4-U | 1,000 | 52.2 | R/W | R/W | 35 | 19 | 23 | 35 | 100 | 30 | Minor Arterial 4-U | 45 | 18 | 2.58 | 71.32 | 0.5 | 18 |
| Minor Arterial 4-U | 20,000 | 62.5 | R/W | 69 | 146 | 36 | 69 | 146 | 100 | 44 | Minor Arterial 4-U | 35 | 18 | 2.58 | 71.32 | 0.5 | 23 |
| Minor Arterial 4-U | 1,000 | 49.5 | R/W | R/W | R/W | 18 | 20 | 27 | 100 | 30 | Minor Arterial 4-U | 35 | 18 | 2.58 | 71.32 | 0.5 | 18 |
| **Design Noise Levels** | | | | | | | | | | | **Design Noise Levels** | | | | | | |
| Collector 2-U | 10,000 | 64.3 | R/W | 90 | 193 | 42 | 90 | 193 | 100 | 69 | Collector 2-U | 55 | 6 | 2.58 | 71.32 | 0.5 | 20 |
| Collector 2-U | 1,000 | 54.3 | R/W | R/W | R/W | 11 | 20 | 42 | 100 | 52 | Collector 2-U | 55 | 6 | 2.58 | 71.32 | 0.5 | 7 |
| Collector 2-U | 10,000 | 62.1 | R/W | 64 | 138 | 30 | 64 | 138 | 100 | 44 | Collector 2-U | 45 | 6 | 2.58 | 71.32 | 0.5 | 15 |
| Collector 2-U | 1,000 | 52.1 | R/W | R/W | 30 | 9 | 15 | 30 | 100 | 30 | Collector 2-U | 45 | 6 | 2.58 | 71.32 | 0.5 | 7 |
| Collector 2-U | 10,000 | 59.4 | R/W | R/W | 91 | 21 | 43 | 91 | 100 | 44 | Collector 2-U | 35 | 6 | 2.58 | 71.32 | 0.5 | 11 |
| Collector 2-U | 1,000 | 49.4 | R/W | R/W | R/W | 7 | 11 | 21 | 100 | 30 | Collector 2-U | 35 | 6 | 2.58 | 71.32 | 0.5 | 6 |
| **Design Noise Levels** | | | | | | | | | | | **Design Noise Levels** | | | | | | |
| Major Arterial 4-D | 20,000 | 67.1 | R/W | 136 | 289 | 67 | 136 | 289 | 100 | 69 | Major Arterial 4-D | 45 | 25 | 10.00 | 71.32 | 0.5 | 38 |
| Major Arterial 4-D | 1,000 | 54.1 | R/W | R/W | R/W | 26 | 31 | 46 | 100 | 52 | Major Arterial 4-D | 45 | 25 | 10.00 | 71.32 | 0.5 | 25 |
| Major Arterial 4-D | 20,000 | 66.0 | 58 | 116 | 244 | 58 | 116 | 244 | 100 | 44 | Major Arterial 4-D | 45 | 25 | 5.00 | 71.32 | 0.5 | 35 |
| Major Arterial 4-D | 1,000 | 53.0 | R/W | R/W | 41 | 26 | 29 | 41 | 100 | 30 | Major Arterial 4-D | 45 | 25 | 5.00 | 71.32 | 0.5 | 25 |
| Major Arterial 4-D | 20,000 | 65.3 | 53 | 104 | 220 | 53 | 104 | 220 | 100 | 44 | Major Arterial 4-D | 45 | 25 | 2.58 | 71.32 | 0.5 | 33 |
| Major Arterial 4-D | 1,000 | 52.3 | R/W | R/W | 39 | 26 | 29 | 39 | 100 | 30 | Major Arterial 4-D | 45 | 25 | 2.58 | 71.32 | 0.5 | 25 |
| **Design Noise Levels** | | | | | | | | | | | **Design Noise Levels** | | | | | | |
| Major Arterial 6-D | 43,200 | 66.0 | 87 | 173 | 366 | 87 | 173 | 366 | 150 | 69 | Major Arterial 6-D | 45 | 38 | 2.58 | 71.32 | 0.5 | 53 |
| Major Arterial 6-D | 43,200 | 75.7 | 87 | 172 | 364 | 87 | 172 | 364 | 50 | 52 | Major Arterial 6-D | 45 | 38 | 2.58 | 71.32 | 0.5 | 52 |
| Major Arterial 4-D | 28,800 | 62.8 | 55 | 108 | 229 | 55 | 108 | 229 | 150 | 44 | Major Arterial 4-D | 40 | 25 | 2.58 | 71.32 | 0.5 | 34 |
| Major Arterial 4-D | 28,800 | 70.8 | 55 | 108 | 229 | 55 | 108 | 229 | 50 | 30 | Major Arterial 4-D | 40 | 25 | 2.58 | 71.32 | 0.5 | 34 |
| Minor Arterial 4-U | 24,000 | 60.6 | R/W | 78 | 164 | 40 | 78 | 164 | 150 | 44 | Minor Arterial 4-U | 35 | 18 | 2.58 | 71.32 | 0.5 | 24 |
| Minor Arterial 4-U | 24,000 | 68.1 | 39 | 77 | 163 | 39 | 77 | 163 | 50 | 30 | Minor Arterial 4-U | 35 | 18 | 2.58 | 71.32 | 0.5 | 24 |
| Collector 2-U | 11,200 | 57.2 | R/W | 46 | 98 | 22 | 46 | 98 | 150 | 30 | Collector 2-U | 35 | 6 | 2.58 | 71.32 | 0.5 | 11 |
| Collector 2-U | 11,200 | 64.4 | R/W | 46 | 98 | 22 | 46 | 98 | 50 | 30 | Collector 2-U | 35 | 6 | 2.58 | 71.32 | 0.5 | 11 |

# Train Noise Worksheet

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Passenger Train | | | | | | | | | | Level | | | | | | | | | Total |
| 2 | Length | MPH | Time | C2 | C1 | Dist. | Car Att | C3 | Car SE | Loco SE | Loco Att | Help | Loco SE | SENEL | #D | #E | #N | Oper | CNEL | CNEL |
| 3 | 940 | 65 | 9.83 | 9.93 | 86.26 | 100 | 0 | 0 | 96.2 | 101.0 | 0.0 | 0 | 101.0 | 102.3 | 1 | 1 | 0 | 4 | 58.8 | 72.8 |
| 4 | | | | | | 200 | 4 | 0 | 92.2 | | 4.0 | 0 | 97.0 | 98.3 | | | | | 54.8 | 68.8 |
| 5 | | | | | | 400 | 10 | 0 | 86.2 | | 9.0 | 0 | 92.0 | 93.0 | | | | | 49.5 | 63.3 |
| 6 | | | | | | 800 | 16.5 | 0 | 79.7 | | 14.5 | 0 | 86.5 | 87.3 | | | | | 43.9 | 57.3 |
| 7 | | | | | | 1000 | 18.5 | 0 | 77.7 | | 16.0 | 0 | 85.0 | 85.8 | | | | | 42.3 | 55.6 |
| 8 | | | | | | 1600 | 22.5 | 0 | 73.7 | | 20.0 | 0 | 81.0 | 81.8 | | | | | 38.3 | 51.6 |
| 9 | Freight Train | | | | | | | | | | Level | | | | | | | | | |
| 10 | Length | MPH | Time | C2 | C1 | Dist. | Car Att | C3 | Car SE | Loco SE | Loco Att | Help | Loco SE | SENEL | #D | #E | #N | Oper | CNEL | |
| 11 | 5200 | 50 | 70.7 | 18.50 | 83.98 | 100 | 0 | 0 | 102.5 | 102.0 | 0.0 | 0 | 102.0 | 105.3 | 22 | 2 | 2 | 48 | 72.6 | |
| 12 | | | | | | 200 | 4 | 0 | 98.5 | | 4.0 | 0 | 98.0 | 101.3 | | | | | 68.6 | |
| 13 | | | | | | 400 | 10 | 0 | 92.5 | | 9.0 | 0 | 93.0 | 95.8 | | | | | 63.1 | |
| 14 | | | | | | 800 | 16.5 | 0 | 86.0 | | 14.5 | 0 | 87.5 | 89.8 | | | | | 57.1 | |
| 15 | | | | | | 1000 | 18.5 | 0 | 84.0 | | 16.0 | 0 | 86.0 | 88.1 | | | | | 55.4 | |
| 16 | | | | | | 1600 | 22.5 | 0 | 80.0 | | 20.0 | 0 | 82.0 | 84.1 | | | | | 51.4 | |
| 17 | | | | | | | | | | | | | | | | | | | | |